JUL 20 1942

ENGINEERING NEWS-RECORD

JULY 16, 1942

...e-assembled deckhouse section is lifted into place ... expedite Liberty ship construction. See p. 61

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In fighting corrosion, too,
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McGRAW-HILL PUBLISHING COMPANY, INC.

Publication Office: 99-129 North Broadway, Albany, N. Y. • Editorial and Executive Offices: 330 West 42nd Street, New York

JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 129 JULY 16, 1942 No. 3

COMING NEXT

• Industrial camouflage, and what to do about it! A *News-Record* report, ten pages of text and illustrations, based on the latest authoritative information from War Department research and directives.

• How an Architect-Engineer-Manager contract works is discussed in an article reviewing the successful application of such a contract on a big Midwest ordnance plant project. The flaws and virtues of this form of contract for use on wartime construction are presented.

• The design of a sewage disposal plant to accommodate an Army camp population varying from 3,500 to 35,000. The problems incident to this unusual requirement and how they were solved will prove a valuable contribution to the technical data file of sewage works engineers.

• Keep 'Em Running: Shovels and Cranes. In this article will be found many valuable suggestions by equipment manufacturers as to how you can make these machines last longer, do a better and faster job. Construction management should find much of interest.

LOOKING AHEAD

• The problem of obtaining satisfactory undisturbed soil samples is one that is difficult of solution, although several important techniques have been developed in recent years. A method, both unique and effective, has just been discovered by the Providence District, U. S. Engineers. This method involves freezing the lower portion of the material to form a plug. In a forthcoming article the equipment and procedure will be described.

• One of the most difficult problems in this war emergency has been that of supplying the necessary housing quickly for war plant workers. By substituting more planning in the office for less confusion in the field, the contractors for a housing project in New York City made it possible for 100 carpenters to prepare column and deck forms for an average of 25,000 sq. ft. of concrete slab daily. This was only one phase of speeding up construction. How the contractors developed their procedure will be told in an early issue.

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25 DAYS SAVED
for the U.S. Government

THIS SPACE WAS FOR
A PICTURE OF THE JOB
...But we can't show a picture.
We can't tell where the job is.
We can say that—
▶ It's a disposal plant at an Army Air Base.
▶ It's a 100% Atlas High-Early cement job.
▶ It's another example of fast wartime building under pressure of time—with Atlas High-Early cement.

THE contractor on this particular disposal plant job turned it over to Uncle Sam nearly a month ahead of time, thanks to Atlas High-Early cement.

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ENR-H-47

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JULY 16, 1942 • VOLUME 129 • NUMBER 3

Water supply, power, roads and sewerage get preference

FWA-WPB agreement sets criteria for war public works precedence; hospitals, health centers, schools, etc. put in second group. War agency backing required.

Standards for determining whether a public works project should go forward during the war have been worked out between the War Production Board and the Federal Works Agency.

There is no final assurance that projects meeting these standards will be granted priority assistance; this has to depend on the varying intensity of material and labor shortages. But FWA has agreed that it will not even seek approval of projects failing to meet the standards that have been set.

Standards to be met

The general standards are substantially those announced some weeks ago as governing wartime construction of plants (*ENR*, June 4, p. 896): the project must be so important that its postponement would be detrimental to the war; it must not duplicate any existing facility that could be converted; the project must have been designed as simply and economically as possible to meet minimum requirements; and sufficient labor, materials, equipment, etc., must be available to build and operate it.

Among projects meeting these standards, first preference is to be given to water supply; then power, fire equipment, sewerage, and access roads in that order. Order of urgency of hospitals, health centers, schools, and recreation facilities will vary in different areas. Before approval, any project must have the backing of the Army, Navy, Maritime Commission, a Lend-Lease agency, or the WPB.

Capacity of water supply and sewerage systems must be based on immediately visible requirements rather than on normal long-term projections of need. An exception is made in favor of sewer mains, interceptors, and outfalls, which may be designed for long range needs if this will not involve more than, say, 10 percent additional material. No sewage treatment plants will be approved unless discharge of the raw sewage would definitely endanger a public water supply; and even in that case, investigation should be made as to whether material could be saved by treating the water supply instead.

Garbage disposal plants will not be considered unless it can be shown that land-fill disposal would cause danger of rat-borne diseases.

Before any road project can be undertaken (including PRA projects) it must be approved by the Army, Navy or WPB Division of Government Requirements.

Before a new hospital can be built, existing hospitals must be 90 percent occupied, and the new construction must not raise the total hospital capacity above 4 beds per thousand population. Requirement for approval of a new public building is that density of occupancy of existing buildings be 50 sq.ft. per person.

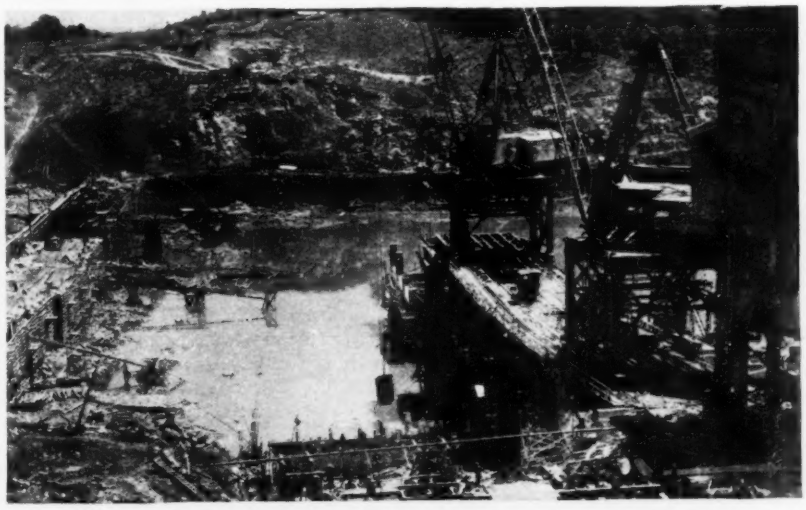
OPA revises machinery price ceiling order

The Office of Price Administration's machinery price ceiling, under which the price of construction machinery is fixed, has been re-issued in a revised form. Chief change from the original order is that the ceiling price for machine parts is based on March 31 prices. Prices of complete machines are still based on October 1, 1941.

Sales by a manufacturer may not exceed his list price on the base date or, if he had no list price, a price computed on costs as of the base date. Ceiling price for sales by a non-manufacturer is his list price, if he had one on the base date, or the cost to him of the machine plus the same percentage mark-up he used on the base date.

As previously, prices of used rebuilt machines are limited to 85 percent of the price of an equivalent new machine and to 55 percent for used machines.

OPA has established ceiling prices for the "Victory Model" cast iron soil pipe sizes which manufacturers are now producing under an arrangement with the WPB. Revision of price schedule 100 provides that the minimum base discount from list for "Victory" pipe shall be 43 points.



First concrete poured on TVA's Douglas Dam

Four months after authorization, a giant crane swings the first bucketful of concrete into place on the Tennessee Valley Authority's Douglas Dam, on the French Broad River.

Placing this concrete on the $30,000,000 structure (ENR June 25, p. 1030) was done a full month ahead of similar work on TVA's Cherokee Dam. Douglas Dam will be almost an exact duplicate of Cherokee, and is expected to be completed within 13 months.

WASHINGTON HIGHLIGHTS

CONSTRUCTION lumber will stay frozen for another month. Last May's order forbidding lumber producers to sell to anyone except the Army and Navy without WPB approval was due to expire this week, but it has been extended until Aug. 13. Thereafter a permanent system of rationing lumber to direct most of it into war uses will be put into effect. Lumber is now recognized as a distinctly scarce commodity.

CONTRACTORS operating under a priority rating granted by a P-19 or P-19-h order may now use the rating to obtain "material which will be wholly consumed at the location and during the construction of the rated project including, but not limited to, explosives, abrasives, perishable tools, forms, scaffolding, and the like." This does not include fuel, construction machinery or repair parts for machinery. Previously, use of the rating was limited to materials entering into the finished project.

BUILDING contractors are permitted, by amendment of L-117, to buy heavy power and steam equipment on ratings granted to the owner of the building. Previously such equipment could be sold only to the person to whom the rating was issued.

ANYONE applying for a PD-1A priority rating should include a self-addressed post card with his application. This will then be returned to him stamped with the case number of his application. If he has not had a reply in two weeks, knowing the case number will facilitate inquiries.

FIVE construction jobs are included by the War Manpower Commission on its list of 138 trades in which there is a nationwide shortage. Inclusion of a trade in this list means that would-be employers must expect to have to train men to fill any openings they have. It also means that Selective Service will exercise care to avoid drafting such men into the army. The scarce trades are: bucker-up, form builder, pipe fitter, structural steel layout man and welders—arc, butt and flash.

AMONG extremely scarce types of steel set forth in WPB's materials scarcity list are: steel plates, structural steel, piling, seamless tubing of 4 in. or less, and wire rope. A little less critical but still insufficient to meet needs are rails, reinforcing steel and pipe. Supplies are not seriously limited in the case of Bessemer steel.

Open longest Central American suspension bridge

The Puente Cuscatlan Bridge over the Lempa River, longest suspesion bridge in Central America and a vital link in the Pan American Highway section within the republic of El Salvador, was recently opened by President Maxiliano H. Martinez.

Main span of the bridge is suspended from two cables comprising a total of 32 galvanized steel bridge strands, 16 on each side and each 1-15/16 in. in diameter. The cables pass through saddles on top of steel towers 102 ft. high. Back spans are not suspended, but are supported by abutment piers.

As shown in the illustration, the bridge consists of two reinforced concrete approaches, 187 ft. 10 in. and 113 ft. 7½ in. long respectively; two structural steel truss spans 98 ft. 5¼ in. and 131 ft. 3 in. long respectively; and the center span, 820 ft. 2½ in. long.

The roadway throughout is 19 ft. 8¼ in. wide, with a one-inch crown. Sidewalks 5 ft. 3 in. wide are included on either side of the roadway. Clearance above normal water level is 94 ft.

Piers at the concrete approaches, and main abutment piers are all heavily reinforced against earthquake shock.

The bridge was erected for El Salvador by the United States Steel Export Co., and the American Bridge Co.

St. Louis asks I.C.C. aid to force track relocation

The City of St. Louis (Mo.) recently asked the Interstate Commerce Commission to order the Terminal Railroad Association to remove its elevated tracks on the river front and to order necessary rerouting of trains now using the elevated system.

With St. Louis' application went a request by the city of East St. Louis, Ill., asking that the I.C.C. order construction of a $700,000 union station which the Terminal Association contracted to build in 1930.

In lieu of the elevated structure now existing, the Missouri city proposes two surface tracks 26 ft. east of the elevated line, within a few feet of the present double tracks of the Missouri Pacific Railroad. The new tracks would be about a foot above the peak of the recent flood of the Mississippi River.

Track changes on the east side of the river, necessary to make the city's plan effective, would cost about $600,000, and new tracks on the river front an additional $350,000 to $500,000.

• • •

Philadelphia to obtain land for street project

The city of Philadelphia has been notified by Pennsylvania Department of Highways officials to proceed with condemnation of property on the south side of Vine St. for the eventual widening of approaches to the Delaware River bridge.

Condemnation of the property, to be done at the State's expense, will be the first step in a $50,000,000 improvement program (*ENR* Nov. 27, 1941, page 765), for elimination of bottleneck approaches to the Delaware River bridge.

Priorities for the necessary construction materials will be asked from Washington as soon as the area has been cleared for the start of construction.

Fear wage rate conflict under pending price ceiling on construction industry

Conflict between Bacon-Davis Act requirements and possible OPA ceiling rulings seen. Order may strengthen AFL's position

Possibility of vexing conflicts between the pending price ceiling on construction (*ENR* July 9, p. 57) and the construction wage freeze worked out by agreement between the AFL and the Department of Labor (*ENR* May 28, p. 879) is feared in Washington government and labor circles.

Both approaches have the effect of freezing wage rates as of July 1. However, there are certain important loopholes in the AFL-Labor Department agreement which so far are lacking in the proposed OPA regulation. This regulation will of course contain an appeals procedure that might permit some variations in wages. But it would mean that every adjustment had to get two separate approvals—one from the Wage Adjustment Board in the Department of Labor and one from OPA. This could be obviated, of course, by an agreement under which OPA would recognize decisions of the wage board. So far, however, no attempt has been made to work out anything of this character.

Thus a contractor could conceivably find himself faced, on the one hand, with a Bacon-Davis Act ruling that requires a wage increase, and on the other hand, an OPA price ceiling prohibiting him from passing the wage increase along.

The wage freezing agreement provides that the rates in effect will be taken as the prevailing rates under the Bacon-Davis prevailing wage law, and that the building trades unions will ask for no wage increases above the July 1 rate except as they may be approved by a new Wage Adjustment Board, of which assistant secretary of labor Tracy is chairman. The board consists of two union representatives and two representatives of federal construction agencies.

So far, the board has had no occasion to reveal its policies on granting wage increases. Only two cases have come before it, and both of these were thrown out on procedural grounds. Present intention, however, is to stand rather firmly on the July 1 base, granting increases only in cases that actually are exceptional —as for instance when a big job is dropped in a small community where rates are so low as not to attract outside labor.

The July 1 base is a fairly stable one to which to hold. Late last May, when the freeze agreement was made, about 20 percent of all building trades wage contracts were in process of negotiation. By July 1, this percentage had been reduced to some 3 percent.

General belief in Washington is that the AFL Building Trades Department, as such, is prepared to stand behind the board in a fairly strict policy. This willingness is probably not shared by a good many local unions, but the procedure under the agreement is rather carefully set up to facilitate internal union discipline on this matter. Before a wage demand originating in a local union can reach the board it must be passed upon and approved by the international union concerned and by the Building Trades Department.

The Wage Adjustment Board expects to adjust wages established more than a year before July 1. Thus there will be some increases in the rates of trades now operating under two-year or three-year agreements.

Another important ground for adjustment recognized by the board is union organization. In an open shop area, the prevailing July 1 rate would necessarily be the non-union rate. If however, a union should organize the area, this would be considered as a change in conditions justifying an increase to normal union scales. Thus unorganized construction workers can get an increase, on federal work, if and only if they join a union.

This later point doubtless influenced the building trades to accept the wage freeze. It illustrates an important element in building trades policy over the past year. Mindful of the way in which they were nearly wrecked, after the last war, by being stuck with wage rates too high to maintain, the construction unions have apparently decided to push for a strong position in the industry rather than for the highest wage rates that could be squeezed out.

Thus the stabilization agreement worked out with the OPM a year ago effectually eliminated CIO competition. And the present agreement may well practically eliminate the open shop, at least on federal work.

• • •

Use 23-year-old wooden pipe for new water main

A 23-year-old investment in 6-in. redwood pipe is finally going to pay dividends to the city of Savannah, Ga.

Seeking to extend its water supply system by about 3,600 ft. to a new cemetery section, the city was unable to obtain priorities for cast iron pipe. Officials bethought themselves of a purchase of several thousand feet of redwood pipe from the stock of a local factory in 1919. On inspection, Louis A. East, superintendent of the city waterworks, reported that the pipe was in "excellent" condition and appeared to be a solution to the problem. City councilmen also examined the pipe and were reportedly so pleased that they asked the water department to consider further purchases of similar pipe.

The pipe is constructed of nine stays, wrapped with heavy three-sixteenths inch galvanized wire. The coils are spaced seven-eighth inch apart and extend the full length of each joint to give the pipe extra strength. All valves and fittings are standard, connections being leaded joints with the exception of connections in a straight run. Such connections are made by butting two pieces of pipe over which a collar is placed. The collar is also redwood.

Texas saves steel in native-stone highway bridge

Completed recently as a part of a 25-mile WPA road construction project in Palo Pinto County, Texas, this 19-arch stone bridge over the Brazos River west of the town of Mineral Wells contains less than 16 tons of steel.

The bridge serves State Highways 16 and 254, and is 440 ft. in length, carrying a 24-ft. roadway. Spans are 20 ft. long.

Huge programs under way to relieve oil transportation shortage in East

Survey shows nearly $150,000,000 worth of work either under construction or contemplated as nation moves to ease conditions

With the Senate acting this week on the bill to provide water and pipeline facilities to move petroleum from Texas to the East Coast, projects to relieve the eastern oil shortage aggregating more than $150,000,000 are now under construction or active consideration.

The present bill, already past the House, would authorize construction by the army engineers of a pipeline across Florida for transhipment of oil from barges on the Gulf coastal waterway to barges on the Atlantic intracoastal waterway. (*ENR*, July 9, p. 67). It also provides for construction of a 12-ft. barge canal across Florida westward from the St. John River, for extension of the Gulf Intracoastal Waterway to the western terminus of the canal, for deepening the Gulf waterway to 12 ft., and for extending it on the west to the Mexican border.

Cost of these projects will total $80,000,000. In addition, the bill would authorize construction, at a cost of $13,000,000 of a pipeline from Charleston, S. C., or Savannah, Ga. This project is opposed by the War Department and the Petroleum Coordinator.

Senate opposition to the bill arises from the fact that the proposed waterway projects will take fifteen months to three years to complete, and the barge canal is seen by some as a mere entering wedge for the Florida ship canal.

Meanwhile, the pipeline portion of the bill has become somewhat academic, since the Defense Plant Corp. and the Petroleum Coordinator have made other arrangements for a line across Florida. The American Liberty Pipeline Co. has agreed to sell to the DPC a 195-mile 8-inch pipe now running from Longview, Texas, to Houston and reinstall it across Florida at a total cost of $2,900,000. The operation is expected to take about four months.

First deliveries of the 24-inch tubing for the 550-mile pipeline from Texas to Illinois are to be made this month. This line is being built for DPC at a cost of $35,000,000 by a syndicate of oil companies known as the War Emergency Pipeline, Inc. About 100 miles of pipe are to be delivered this month, and the last deliveries are to be made in November.

In addition to these major projects, the Petroleum Coordinator has worked out with various oil companies a series of comparatively minor pipeline jobs designed to improve the eastward flow of oil. Aggregating some $30,000,000, these projects involve reversals of existing lines, improvement of pumping facilities, and some new construction. Among the larger of the construction jobs are:

The Texas Pipe Line Co., 110 miles of 10¾-inch and 8⅝-inch lines between Dallas and Stuart, Oklahoma; Stanolind Pipe Line Co., 54 miles of 12-inch line between Graford, Texas, and Healdton, Oklahoma; Illinois Pipe Pine Co., 152 miles of 8-inch line across Ohio; Plantation Pipe Line Co., 212 miles of 10¾-inch and 80 miles of 8-inch second-hand pipe line from Beaumont, Texas, to Baton Rouge; Project Five Pipe Line Co., 158-mile products line from El Dorado to Helan, La., using 10¾-inch pipe reclaimed from existing lines.

• • •

Material cut halts work on Blue Mountain Dam

Restrictions of use of critical materials has caused the U. S. Engineer Office at Little Rock, Ark., to announce temporary stoppage of work on the Blue Mountain flood control dam, on the Petit Jean river near Booneville, Ark.

The dam is now about 55 percent complete.

An announcement said that it has become practically impossible for the contractor to secure necessary operating supplies and repair parts for continuance of construction of the embankment and spillway, under the dam's existing low priority rating. A recent application for a higher rating was rejected by the Army and Navy Munitions Board.

"Work on the dam has reached a point where diversion of the river must be commenced or the work stopped," the announcement said. "If this river closure is initiated, it is imperative that the work be carried to completion.

"It is expected that the contractor at the dam will continue work for about one month, after which all construction work will cease."

The dam was planned as one of a series of ten in Arkansas to prevent floods on the lower Arkansas river. Specifications called for a flood control capacity of 233,000 acre-feet on the Petit Jean, which contributes much water to the Arkansas river. The dam was to be 115 ft. high and 2,700 ft. long, an earth structure. Myers, Myers and Goen, of Salem, Ind., held the contract for construction of the dam proper.

Norfork Dam work continues

Construction of Norfork Dam and reservoir on the north fork of the White River, 13 miles southeast of Mountain Home, Ark., probably will be continued, according to Col. A. M. Neilson, Little Rock district engineer.

The dam has been authorized as a flood control measure, and for generation of hydro-electric power. Construction work there is ahead of original schedule, but completion date may be delayed because of material shortages, Col. Neilson added.

Ohio relocates highway to avoid floods

To avoid recurrence of damage due to flooding of the old road, the Ohio State Highway Department recently announced completion of relocation work on 3.5 miles of State Route No. 7, in Galea and Lawrence Counties.

The new highway is 22 ft. wide and is situated 30 ft. above the old road. The relocated road was constructed with a stabilized base on which a bituminous treated surface was laid.

Construction work included 397,881 cu.yd. of road excavation, 2,000 cu.yd. of rock excavation. A considerable amount of rock was used in building 2,000 ft. of embankment.

Contract price was $351,855. General contract was held by A. J. Baltes, Norwalk, O.

BRIEF NEWS

THE Pennsylvania Department of Highways has granted a six months' extension to public utilities for the installation of reflector buttons on poles situated along highway rights-of-way. A deadline had previously been fixed for July 1. Three buttons are to be placed on all utility company poles within eight feet of the highway. Recently a number of utilities informed the department that the work couldn't be completed within the specified time, because of war-time material shortages.

LA ANGOSTURA Dam on the Bavispe River, Northwestern Sonora State, Mexico, one of four similar dams being built by the Mexican government, was formally dedicated recently by Marte R. Gomez, Minister of Agriculture. The dam will provide 16,300 hp. for generation of electricity, as well as water for irrigation in the area.

EXAMINATIONS for appointment as assistant sanitary engineer and passed assistant sanitary engineer in the regular commissioned corps of the United States Public Health Service will be held at Washington, D. C.; Chicago, Ill.; New Orleans, La.; Kansas City, Mo.; and San Francisco, Calif., at 9 a.m. on Aug. 3, 1942. Applicants should address the Surgeon General, U. S. Public Health Service, Washington, D. C., for permission to appear before the board of examiners.

PLANS for partial consolidation of the District Army Engineer's offices at Denison, Texas, are in progress. New quarters for three sections—personnel, Red River Review report, and contract and supply—will occupy 10,000 sq.ft. of space in the Perkins Building at Denison. Headquarters are to be maintained in the Citizens National Bank Building.

THE North Carolina Highway and Public Works Commission has postponed until June 30, 1943, its deadline for removal of all advertising signs on leased property within 50 ft. of the center of highways.

• • •

New Waterloo Bridge to be opened soon

Construction work on London's new Waterloo Bridge, has been completed and the new structure is scheduled to be opened to traffic as soon as approaches are finished, some time in September.

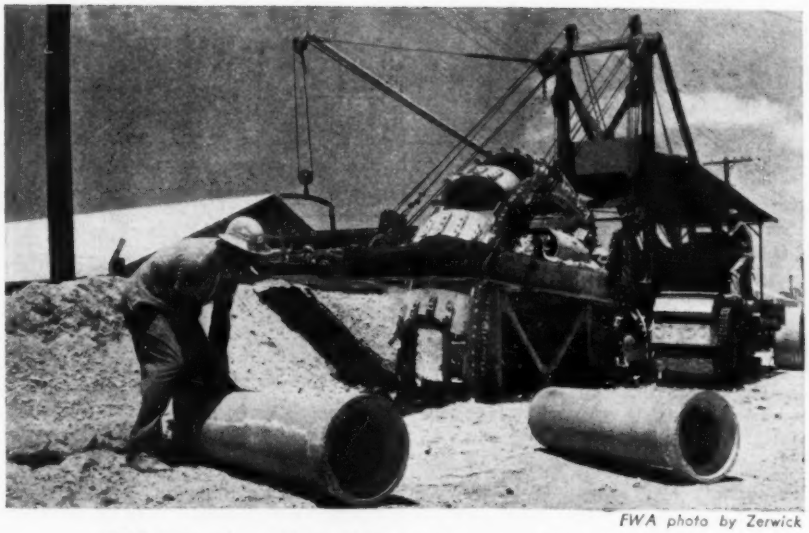
The structure is expected to be a key point in the reconstruction of south central London, when war-damaged areas are cleared and rebuilt after the war.

Work on the new structure took longer than had been anticipated, largely due to delays imposed by wartime. (*ENR* April 30, p. 738). Demolition of the old bridge started in 1936, and construction of the present structure began in 1937.

The new bridge comprises three central spans of 252.7 ft. each, and two shoreward spans 242.7 each. The superstructure rests on piers of reinforced concrete that are 2 ft. 3 in. wide and 83 ft. long. While these carry the whole weight they are surrounded by granite-faced shells 14 ft. wide and 106 ft. long.

The 80 ft. deck carries two roadways 27 ft. wide, and two sidewalks 11 ft. wide.

An innovation for British engineering practice was the adoption of electric arc welding for the joining of reinforcing bars.



FWA photo by Zerwick

FWA rushes Key West sewage disposal job

Ditching in coral rock with specially constructed, heavy-toothed ditchers, and contending with numerous subterranean streams, a sewage project designed to provide sanitation for large areas of Key West, Fla., is being pushed at top speed as a war public works project.

The project consists of a collection system of approximately five miles of sewerage line, two disposal plants, and a new outfall line from one of the new plants. Sewage is now disposed of through two Imhoff tanks which will be used until the new system is completed. A Federal grant of $245,510 finances the work.

Concrete pipe, reinforced in the largest sizes and non-reinforced in the smaller sizes, is being used as materials are available in South Florida. All pipe and other materials, including aggregates, must be transported by barge from Miami. Structural concrete is mixed in Key West by using rain water collected there. For massive and non-reinforced concrete portions, local concrete composed of native marl, cement mixed with brakish water, is used.

The specially designed ditchers, built to contend with coral rock stratum, are made with various parts much heavier than the conventional type. Gear ratios are especially adapted for slow-speed, heavy-duty work. Routers and buckets are made of special tool steel. Even with these refinements, continual replacements are needed. Minimum speed under adverse conditions is 30 ft. hourly at 6 to 10 ft. depth. Maximum speed under favorable conditions is 40 ft. hourly.

Maurice H. Connell & Associates are engineers of the project. Contractors are W. T. Smith Dredging Corporation of Miami, and the Langston Const. Co. of Orlando, Fla.

Chicago approves plan to convert six bridges

Chicago city councilmen last week approved an agreement with the U. S. Army whereby the city will spend $840,000 to convert its six fixed bridges across the south branch of the Chicago River and Drainage Canal into movable structures (*ENR* June 4, p. 896).

Councilmen said that the army had agreed to pay the salaries of bridge tenders—an estimated $60,000 a year—for the duration.

Bridges to be converted are at Western, Kedzie, California, Cicero and Harlem avenues, and Pulaski road.

All of the structures to be converted now provide 22-ft. vertical clearance for barge and collapsible-stack tow boat traffic on the waterways. Most of the bridges were designed with movable spans, but operating machinery and power were never installed.

Colorado Aqueduct water offered outside districts

The vast water resources of the Colorado River Aqueduct have been made available during the war period to protect and serve certain war industries and home defense areas situated outside the boundaries of the Metropolitan Water District of Southern California, according to W. P. Whitsett, chairman of the district board of directors.

Previously, Mr. Whitsett said, the protection and water service afforded by the aqueduct system had been made available for civilian use only to fourteen cities and areas that comprise the district, and to areas annexing themselves to the district.

The new policy was adopted as a war measure for the purpose of extending immediately and during the period of emergency the protection of the aqueduct water supply to such areas as are specifically designated by U. S. military authorities.

The terms and conditions upon which the district authorizes the service of aqueduct water to areas outside its boundaries include: Services shall be provided only when directed by competent U. S. military and naval authorities; emergency service thus given shall be for the period not exceeding the duration of the present war; areas served are required to have installed, without cost to the district, the necessary water lines connecting with the district's water delivery system; the rate paid for the service consists of a standby charge and a water delivery charge. The amount of the standby charge for any given area is equivalent to the amount that would result from the application of the district's tax rate against the area served.

It was stressed that the war policy does not take the place of the procedure of annexation. In most instances, it is believed annexation will be advantageous for outside areas rather than seeking to obtain service in accordance with special emergency regulations. "This emergency service," Mr. Whitsett said, "is designed solely to render the greatest possible assistance and has the effect of providing water supplies and water reserves from multiple sources always on tap to meet in practically unlimited quantities any emergency that arises."

• • •

Wilmington, N. C. voters approve water bond issue

Voters of Wilmington, N. C., recently approved the $600,000 bond issue to finance construction of a water line designed to eliminate salt water infiltration in the municipal supply (*ENR*, Apr. 2, p. 519 and previous).

Under the program, for which the Federal Works Agency will put up about $2,000,000 in addition to the city's contribution, a new main will be built to Kings Bluff, a government lock and dam 20 miles up the Cape Fear river from Wilmington, the abandonment of the present city reservoir at Toomer's Creek and building of a 22-mile pipe line leading to a new supply at Kings Bluff.

Meanwhile, work has started on drilling four of 14 wells planned to offset the expected high salt content of the regular municipal water supply during the late summer months.

British plan peacetime construction priorities

To provide an orderly means of returning to peacetime building practice and employment in the construction industry, a system of priorities for the British construction industry, will be continued, Lord Portal, Minister of Works and Planning, said last week.

Summarizing the British construction situation, Lord Portal predicted a post war shortage in dwelling accommodations but said that construction of churches, schools, harbors and ports must also be rebuilt or repaired. To secure the right use of the land for all purposes, it is recognized by the Ministry that existing planning powers are inadequate, and legislation must be passed to amend, strengthen and extend the present law.

As a first step in carrying out such a policy, a Ministry of Works and Planning Bill has already been introduced in parliament.

Meanwhile, post war reconstruction plans are being prepared by some of the heavily damaged provincial towns in England—Plymouth, Southampton, Coventry and Hull. In London a beginning has been made by the preparation of provisional plans for the damaged interior sections of the capital.

Patrick Abercrombie has been appointed to prepare the redevelopment scheme for the County of London and has been directed to cooperate with members of similar planning program groups now working for towns and other areas located near the London region including the counties of Kent, Surrey, Middlesex and Essex.

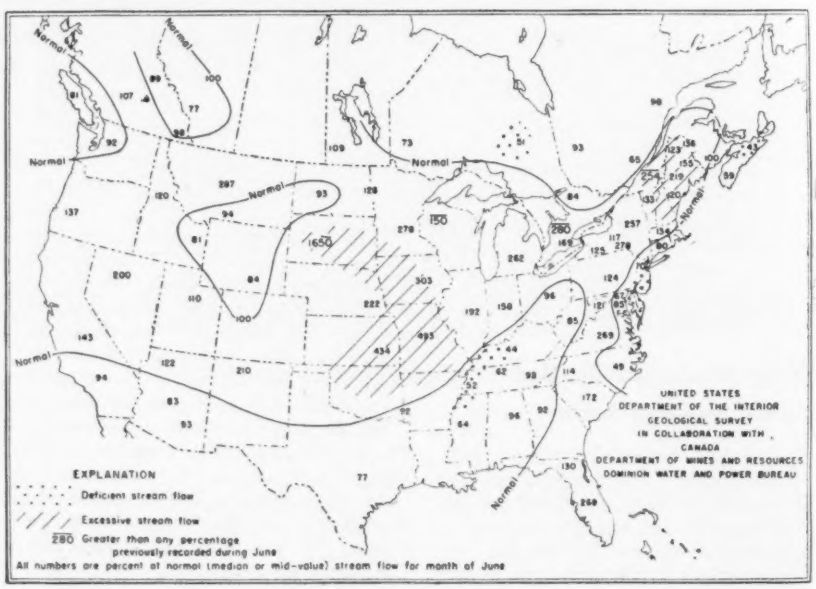
Report notes increase in irrigation storage in U. S. and Canada

Almost without exception, all major storage reservoirs used for irrigation and power in the United States and Canada contain more water than they did a year ago, according to the U. S. geological survey's monthly joint stream flow report for the United States and Canada.

Stream flow conditions during June in Canada were generally normal except for floods on the St. Johns River in New Brunswick, and the St. Francois River in Southern Quebec. In general, deficiencies in stream flow were not excessive, and the outlook for water conditions for both power and irrigation continues especially favorable in Canada.

Conditions in the United States are also generally good, excepting for continuing drought in a narrow fringe along the Atlantic seaboard, extending from Nova Scotia to North Carolina.

Drought also continued in Western Kentucky, Western Tennessee and Northern Mississippi.


Normal
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
IN COLLABORATION WITH
CANADA
DEPARTMENT OF MINES AND RESOURCES
DOMINION WATER AND POWER BUREAU
EXPLANATION
Deficient stream flow
Excessive stream flow
280 Greater than any percentage previously recorded during June
All numbers are percent of normal (median or mid-value) stream flow for month of June

OBITUARY

Walter H. Norris, 72, bridge engineer in the employ of Maine railroads for a half century, died at Portland, Me., July 11. He had been employed for more than thirty years as bridge engineer for the Maine Central system in New England. Structures and their foundations for which he was responsible including five spanning the Kennebec River at Augusta, Waterville, Fairfield, Norridgewock and Solon. A sixth structure is the bridge spanning the Sheepscott River at Wicasset, one of whose spans, 400 ft. in length, is one of the longest in a New England bridge.

Elmer A. Fiedler, 77, veteran engineer, died at his home at Chardon, Ohio, recently. From 1908 to 1915 he was resident engineer in Chardon for the State Highway Department, and was later village engineer for Chardon and Burton.

David Henry Urquhart, 72, died recently at Quincy, Fla. Formerly of Waycross, Ga., he had been for a number of years an engineer for the Atlantic Coast Line Railway.

Charles Willis Brooks, 74, vice-president of the Porcupine Co. of Fairfield, Conn., and an expert on plate fabrications, died July 7 at Bridgeport.

Henry Shipley Shotwell, 59, building superintendent died recently at Philadelphia.

Julian de Bruyn Kops, formerly city engineer at Savannah, Ga., and a widely known civil engineer, died recently at Atlanta.

Frank P. Hopkins, 69, engineer in Cleveland for more than 30 years, died recently at Cleveland.

Alfred C. Clas, 82, prominent Milwaukee architect, died there July 8. He designed the Milwaukee auditorium, public library and museum, the Plankington Hotel, the Tripoli Temple, and many other buildings in the city. He was a member of the first County Park Board.

E. Brown Baker, 72, construction engineer who built seven locks and six dams on the New York State Barge Canal, died July 12, at Utica.

Patrick W. Mulderry, 82, leading general contractor of Albany, N. Y., died there July 7.

A. Troy Goodwin, 58, superintendent of the Dunn, N. C., city water department since 1936, died there July 6.

Dam closure means more water for Washington

Officials of the Washington (D.C.) Suburban Sanitary Commission recently closed the last opening in the commission's new dam on the Patuxent River at Triadelphia, Md., preparatory to impounding the reservoir's first billion gallons of water.

The dam, a part of a $2,500,000 program to increase the water supply of the Washington metropolitan district, is expected to flood some 75 acres of land when at its full capacity of 6,500,000,000 gallons.

The structure is expected to be completed some time in September. Other features of the water supply project include an intake on the Patuxent River and a pumping station with a capacity of 13,000,000 gal. daily; a force main to a filter plant with a nominal capacity of 10,000,000 gal. daily near Laurel, Md.; and a filtered water supply line to Branchville to connect with the present distribution system in Prince Georges County.

• • •

Florida to complete Key West highway

The Florida state road department within the next month will ask for bids on work to complete construction of new sections of overseas highway from the mainland to Key West, over the abandoned road bed of the Florida East Coast railway.

CONTRACTS AND CAPITAL

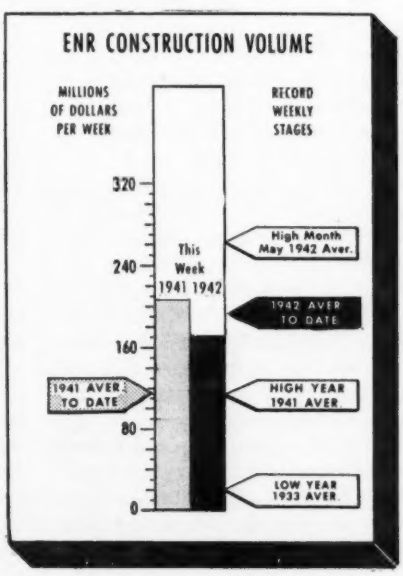
ENGINEERING construction volume for the week totals $174,129,000 which is 57 percent below the high volume of $401,603,000 reported last week and 16 percent below the corresponding 1941 week. Public construction shows a drop of 58 percent from last week and 12 percent below the 1941 week. Private construction is 6 percent lower than last week and 55 percent lower than the 1941 week.

Federal contracts dropped 59 percent below last week but show a slight gain over the corresponding 1941 week.

With this week's total the volume for the 29 weeks reaches $5,698,849,000, compared with $3,421,095,000 for the same period last year, a gain of 66 percent.

Public buildings, which last week recorded the second highest total this year, show a drop of 67 percent while unclassified construction dropped 41 percent. Subtotals for the week in each class of construction are: waterworks, $2,267,000; sewerage, $2,072,000; bridges, $2,516,000; industrial buildings, $5,134,000; commercial buildings, $2,325,000; public buildings, $98,318,000; streets and roads, $16,536,000; earthwork and drainage, $3,281,000; and unclassified construction, $41,680,000.

New capital for construction purposes for the week totals $511,000 for state and municipal bonds. This brings the total for the year to date to $7,801,129,000, a gain of 59 percent compared with $4,922,670,000 for the same period of 1941.



CONTRACTS

(Thousands of dollars)

	Week Ending July 17 1941	July 9 1942	July 16 1942
Federal	$155,340	$385,095	$156,351
State & Municipal	34,302	8,271	10,073
Total public	$189,642	$393,366	$166,424
Total private	17,123	8,237	7,705
TOTALS	$206,765	$401,603	$174,129
Cumulative 1942 (29 weeks)			$5,698,849
1941 (29 weeks)			$3,421,095

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 29 weeks	1942 29 weeks
NON-FEDERAL	$795,281	$519,353
Corp. Securities	277,590	150,959
State & Mun.	287,918	158,275
U.S.H.A. loans	30,399	.....
R.E.A. loans	500	.....
R.F.C. loans	35,874	127,419
Fed.-Aid—Highways	163,000	82,700
FEDERAL	$4,127,389	$7,281,776
TOTAL CAPITAL	$4,922,670	$7,801,129

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	July '42	277.65	133.46
Building Cost	July '42	223.45	120.79
Volume	June '42	752	330

FHA MORTGAGES

	Week Ending July 11 1941	July 4 1942	July 11 1942
Selected for appraisal			
Title II	$30,794	$5,286	$4,979*
Title VI	$ 5,217	$11,615	$13,361*

* Subject to revision.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Air-Raid Shelters

Sir: We were interested in the article "Air-Raid Shelter for Fifty People" (*ENR* June 4, 1942, p. 904) because, although the design and purpose of this reinforced-concrete structure is not comparable with the Armco corrugated metal air-raid shelter for fifty people, it is nevertheless in a field in which we have concentrated much study.

The design of the shelter in your article called for 150 cu.yd. of concrete and 13 tons of reinforcing steel at a total cost of $15,000. This structure, as buried, will withstand 100-lb. demolition bombs, and has a number of facilities and conveniences.

The corrugated metal shelter of the same capacity is semi-buried and is splinterproof against 500-lb. demolition bombs falling within 25 ft. It requires only six tons of 12-gage steel and costs less than $1,500 installed. Time of installation and readiness for use is only a matter of a few days.

If conservation of steel, time, transportation facilities and money are as important as we believe they are, a small percentage of safety can be sacrificed in favor of the metal structure. And some day the latter can be salvaged and used for large culverts, bridges, and sewers.

W. H. SPINDLER
Armco Drainage Products Assoc.
Middletown, Ohio

Varied Safety Factors

Sir: In reference to my letter published on p. 900 of the June 4, 1942 issue of *Engineering News-Record*, and commenting on the article "Saving Reinforcing Steel by Rationalizing Safety Factors" by A. J. Boase (*ENR*, May 7, 1942, p. 785) I wish to call attention to the omission of several lines of text that explained the significance of the girder span of 59 ft. obtained by the second formula cited. This span resulted from attempting to use the same dead load-live load ratio for slab and girder as Mr. Boase suggests. The omitted lines from my letter state: "This is a very unusual span length for that loading, except in the case of out-of-the-ordinary structures. This is certainly long span construction such as would obtain in highway bridge construction and the remedy would therefore be the same as is used in such specifications, viz.: application of different intensity of live loading for the girder from that used on the slab."

M. HIRSCHTHAL
Concrete Engineer
Delaware, Lackawanna and Western Railroad Co.
Hoboken, N. J.

Plaster for War Buildings

Sir: For a great many years the building industry has recognized the permanence, fire-protective, insulative, decorative and sanitary advantages of lathing and plastering. But, with the coming of "all out" war demanding the fastest possible construction of factory buildings of all kinds and descriptions, schools and other public buildings and unprecedented construction of war housing, there were those who felt the lathing and plastering industry's products non-adaptable to the war effort because of their cost and time-consuming qualities.

The Northwest Plaster Bureau has knocked most of these notions into a "cocked hat" by demonstrating that the lathing and plastering industry can and does deliver a product combining all the historic advantages of its craft competitively in both cost and time with all other forms of emergency construction.

In fact, buildings on which this organization has persuaded the use of its products, have established time records exceeding by as much as 50 percent those made with popularly conceived "speed construction" involving materials less desirable from the standpoints of fire protection and sanitation. On one project, for example, involving the emergency construction of several hundred houses at Pendleton, Ore., the industry was able, through its streamlined activities, to complete the lathing and plastering operation on the entire project during the dead of winter in 19 working days.

It is also significant to note that all major war housing projects in the Northwest have been lathed and plastered, despite the fact most of them have carried 90 to 120-day construction limits and allowed alternates for wallboards, plywood and other materials, which would have certainly been used had they been either cheaper or faster than lath and plaster.

Much school construction in the Northwest, both of permanent and temporary nature, also has used products of the industry, including stucco and plaster, because of the advantages of adequate fire protection, speed and adaptability.

Operating as a branch activity under the trade magazine *Northwest Plastering Industries*, which has attempted a coordination of all forces within the industry in this large area since February, 1938, the war emergency services of the industry blossomed into full force with formation of the Northwest Plaster Bureau in January, 1942. It is an industry-wide cooperative developmental organization, representative for the first time in the United States of all branches and activities within the industry. Its membership includes manufacturers serving the area, local building material dealers, lathers, plasterers and cement finishers local unions (A. F. of L.) and lathing and plastering contractors throughout the northwest area.

Its executive board forms its broadest policies and is representative of all groups within its membership. Further coordination is given to the organization by the functioning of two or three-men groups in each principal city known as "local promotion committees."

When the Northwest Plaster Bureau's local committees encounter a condition involving a substitution of other materials for lath and plaster, facts on the case are assembled and forwarded to the central office. If it is a question of price, facts, bids and other information are assembled, and the bureau goes to work. If it is a case where the awarding agency feels there is not sufficient time to lath and plaster the project, the union representatives are called in and production schedules that can be guaranteed are developed. Never yet has the promise of the bureau been broken on this score.

Also, the bureau acts as the clearing house for all problems, situations and conditions within the industry or arising from its customers. Operated without profit, and with small membership fees in the form of pledges, it is revolutionizing previous notions concerning lath, plaster and stucco in the Pacific Northwest.

CHARLES F. CLAY, Director
Northwest Plaster Bureau
Seattle, Wash.

Larger Electrodes Favored

Sir: Our greatest progress in the furtherance of our present war effort is not going to be by building more plants but by using more efficiently the plants we have. The greatest error we have made so far is that we think of production in terms of man hours rather than in terms of what that man in that hour can do.

In the present building of ships, for example, $\frac{1}{8}$-in. and $\frac{5}{32}$-in. electrodes are largely being used for welding. If these should be changed to $\frac{3}{16}$ and $\frac{1}{4}$ in. the speed of welding would be more than doubled. The cost of the electrode also would be reduced, the production of electrode by the same number of man hours would be increased, and the reliability of the joint would be increased.

The great problem we have is not more welders, more shipyards and more men but more efficiency with what we now have. Man hours alone will never beat the Axis.

J. F. LINCOLN, *President*
The Lincoln Electric Co.
Cleveland, Ohio

Square and Cube Root With a Calculator

Sir: The mystery is taken out of the "successive odd number" method of extracting square root on a calculator in the well-written material by S. L. Goldberg on page 93 of your July 2 issue. However, there is a method of obtaining the root correct to five significant figures with only three calculator operations. As this method has been developed since publication of the latest issue of engineering handbooks, you may wish to pass it along to your readers. Application of this method requires the use of a table of "nearest numbers" in three figures which occupies only a single lettersize sheet. With such a table and a calculating machine the process in extracting the root of, say, 5,331.172 is:

(1) Set up 5331172 at left of calculator keyboard and, with carriage at extreme right, touch the Add Bar.

(2) From table select "nearest number," 5300000, and similarly set it up in the keyboard and touch the Add Bar.

(3) As 5331.172, when divided into "periods," has two figures (53) in its leftmost "period," a devisor is selected from the table in Column 2 alongside the "nearest number." This devisor, 1456022, is set up at extreme left of keyboard, and Division Key is depressed. The square root correct to five significant figures, namely, 73015, written as 73.015, appears in the quotient dial.

Equally simple means are provided for converting the five-figure root to one of ten figures.

The devisor corresponding to any "nearest number" is twice the square root of that number to seven figures, there being, of course, two such devisors for each "nearest number" according as the left-hand "period" contains one or two digits. The crux of this method is that the "nearest numbers" of the table are so selected that the error of the root will never exceed 5 in its sixth significant figure.

The principle of this method is old but the tabulation of "nearest numbers" and their associated precalculated double square roots in such a way that the error will be kept within the specified limit, is believed to be new; a development by Harold T. Avery.

"Nearest number" tables, for both square and cube roots, may be had free from any Marchant agency.

TRACY W. SIMPSON
Marchant Calculating Machine Co.
Oakland, Calif.

Concrete Floor Systems

Sir: We were very much interested in the article "Studies of Steel Economy in Concrete Slabs and Columns," by A. J. Boase (*ENR*, May 21, 1942, p. 866). We note in particular the table giving the steel quantities for seven types of floors. The table clearly points out the superiority of the flat slab design.

The "Grid System" of reinforced-concrete construction has often been in competition with the solid flat slab construction, and the savings in general have run from 20 to 30 percent in concrete and from 10 to 20 percent in reinforcing steel. Under present conditions, where the saving in reinforcing steel is of paramount importance, we recently have been making our comparisons where the amount of concrete is the same as in the solid flat slab, thereby making the entire saving in the reinforcing steel.

Some calculations made on a solid flat slab for an interior panel of 20x20 ft. and for a live load of 100 lb. per sq.ft. gave for the weight of steel 2.13 lb. per sq.ft., which is the same as in the table given in the article. This design was based on a solid slab $7\frac{1}{2}$ in. thick with a drop panel 7 ft. square by $3\frac{1}{2}$ in. thick, and a column cap 4 ft. 6 in. in diameter. Calculations were also made on a "Grid" flat slab, having the same amount of concrete, for an interior panel of the same size and live load, basing the design on 8-in. domes plus 3 in. of concrete topping, a drop panel 7 ft. square by 4 in. thick, and a column cap 4 ft. 6 in. in diameter. The weight of reinforcing steel figured 1.41 lb. per sq. ft., showing that the solid flat slab required 50 percent more reinforcing steel than the "Grid" flat slab.

The above saving is effected without increasing the allowable stresses or decreasing the live or dead loads; in other words, without making any changes in existing codes.

EDWIN F. ALLBRIGHT
Secretary and Engineer
Grid Flat Slab Corp.
Boston, Mass.

Penny Saves Costly Repair

Sir: Under a heading of economy of labor and materials here is a good job done with a penny: in a building an elevator governor of the ball type became noisy. Investigation indicated excessive wear of a bearing on a vertical shaft, the bottom of which was revolving on a cast-iron shouldered base. Renewing the governor meant re-machining the entire assembly and involved a three-day tieup and a large outlay for materials and labor.

The repair was made by lifting the vertical shaft, dropping a copper penny into the cup of the base, thereby raising the shaft sufficiently so that the wear on the bearing was compensated.

JACOB MARK
Consulting Engineer
Brooklyn, N. Y.

EDITORIALS

VOLUME 129 NUMBER 3

July 16, 1942

On This Week's Calendar

TWO WORTHY CAMPAIGNS command the attention and deserve the support of the construction industry this week and for some weeks to come. Both are directly concerned with shortages—in the one case of manpower, in the other of materials—that threaten to pull production down from the peak that it must attain if we are to win the war. To conserve the manpower that we now have, and thus avoid a shortage, the National Safety Council is seeking a $5,000,000 fund to enlarge its accident prevention work, which in the past has paid large dividends to industry generally. To insure against a shortage of material, the steel industry is financing a nation-wide campaign to collect every conceivable kind of scrap, not only steel but non-ferrous metals, rubber, etc. That a better safety record will actually conserve manpower is strikingly evident from last year's statistics—18,000 killed by occupational accidents; 26,000, equivalent to two army divisions, killed in the 20 to 45 selective service age bracket from all types of accidents; and 460,000,000 man-days of labor lost. That increased scrap collections will increase steel production is emphasized by periodic shutdowns of furnaces for lack of such material. Both campaigns have been indorsed by President Roosevelt and Donald Nelson as integral parts of our national war effort. Both can readily be regarded as good investments for the construction industry, and both are in the "do-it-now" class. Checks may be mailed to the National Safety Council in New York City; scrap may be turned over to local salvage committees that will soon be active in every city and town. Any contribution to either cause will help win the war.

They Also Serve

SOMEWHERE in the list of heroes who will deserve the homage and gratitude of their fellow countrymen for their contribution toward winning the war should appear the names of a goodly number of municipal engineers. In city after city, where a normal population growth of five, ten or even twenty years has been compressed into one by the presence of military establishments or war factories, these engineers are battling valiantly to meet unprecedented demands for water, sanitary facilities, housing and traffic relief. Their hours are long, their pay check is no fatter, their staffs are undermanned, and their troubles with priority ratings are legion. Yet they do no more complaining than would any soldier beset with equal ills. And like the soldier they gripe and go ahead. There is a job to be done, and unless it is done a vital part of the war preparation will slow down or stop. It is important to remember this fact: that municipal services and the engineers who supply them determine whether factories run or not, and whether workers have homes in which to rest, water to drink and sanitary surroundings in which to live. How the municipal problems of the war emergency are being faced in several of our key war cities is to be outlined in a group of articles. San Diego is considered in this issue, and El Paso and its problems will be covered next. Were either of these cities—or Norfolk, Wichita, Paterson, Hartford or a dozen others—to fall down on its job, it would be as serious as the loss of a battle. The engineers who guarantee against such disasters are serving their country well.

Keep Cost-Plus Contracts

CONGRESS SHOULD WEIGH WELL any proposal that is made by its members to take away the Army's right to let cost-plus-fixed-fee contracts. Better still, it should persuade the proponents of the idea to forget it for the duration. Time was, even less than a year ago, when the various types of contracts could be discussed properly and debated pro and con. They were so discussed in these columns. There is little sense and the possibility of much harm in reopening discussion of Army contract procedure at this late date. As a matter of fact, the Army has turned in creditable results with each type of contract it has tried. True, the various investigating committees unearthed evidence here and there of waste, bad management and delay, but they highlighted the bad without balancing it against the good. And the balance, considering the tremendous program involved, is favorable enough to be acceptable. The cost-plus-fixed-fee contract, solely on its record, proved to be a worth-while expedient. But the principal reason why it should continue in use is that the Army thinks it needs it. A good rule these days is to give the Army what it wants, and not add to its troubles by quibbling and sniping.

Contractors' Versatility

SHIPS AND MORE SHIPS are urgently needed in the present national crisis. The shipbuilding goal for the United States in 1943 has had recent revisions roughly as follows: Before Pearl Harbor, six million tons; in January, ten million tons; early in May, fifteen million tons; and by the middle of 1942, twenty million tons. This increase in schedule of more than 300 percent in a six months period means an enormous production step-up—something that could be programmed successfully only by men of courage and imagination. These are qualities which the modern contractor must have. It is significant that the best shipyard records are being made by men whose experience has been largely in the heavy construction industry. At the Oregon Shipbuilding Corp. yard, men from the construction industry form the nucleus of the group that developed pre-assembly to an unprecedented degree and devised new methods that have broken world records for speed. Such qualifications as "skill, integrity and responsibility" are highly desirable qualifications, but for performance that is to break world records something more is needed. Perhaps it is courage to disregard precedent, and imagination of a sort that approaches vision. It is refreshing to find that our construction men have what it takes!

From Construction to Production

WITH CONSTRUCTION CONTRACTS in recent weeks breaking all records for total volume, it is difficult to realize that the day is approaching when war construction will taper off. However, orders already have been issued to start no work that cannot be completed by this time next year, and the WPB is now emphasizing the conversion of old plants instead of construction of new facilities which use too much critical material. Despite the recent award of a few unusually large war-construction contracts, it is clear that the plants to produce war equipment and the buildings to house the men or store the supplies needed for our all-out effort are nearing completion. Likewise the work involved in expanding water supplies and sewage disposal plants to serve cities expanded by war industries, now at a peak, will mostly be nearing completion by the early part of next year. Emphasis henceforth will be on production rather than construction.

What is to be the construction industry's part in this changing picture? The answer is not clear. That there will be a continuing amount of new work seems obvious, for no program so vast as the current one can go forward without replacements and adjustments to meet changing war demands. Shipbuilding will continue to take a large number of men, and many should come from the construction industry because the step from shipyard construction to shipbuilding is not as difficult for them as for men released by other industries whose operations are being curtailed. Then, too, there is the construction work incident to opening up new mining deposits of secondary ores; and the access-road and flight-strip programs are far from complete.

Also, there are indications that there may be a large amount of construction abroad as the American forces begin to take over new fronts or take an active part on existing ones. This work will be carried out by construction units of the Corps of Engineers of the Army, or by the newly organized construction battalions of the Navy. This means that many more contractors and engineers will go into military service during the next few months. Further contract operations abroad, such as those on the Pacific islands, in the West Indies, Newfoundland, Northern Ireland and the Near East that were entered into before this nation became an active belligerent, now seem to be out of the picture. Work that must be done in regions subject to possible enemy attack must be done by armed forces.

That the readjustment is going to be difficult is apparent, but that is part of the cost of the war that must be faced by people in every occupation. Looking into the future, however, it seems logical to conclude that before the end of 1943 the war industries will be fully manned and the armed forces will be at maximum strength. When that time comes, relaxation of existing restrictions will become the order of the day, because the national income must be kept at the highest possible level in order to carry the ever-growing tax load. That should mean a steady revival of more normal construction, beginning probably with road building, to repair the damage done by the forced neglect of today.

But whatever comes in the next few months, we are confident of this: The construction industry can be counted on to make any sacrifice that is necessary to win the war. Along with the rest of the nation, winning the war is its main objective now.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* *Copyright 1942, by McGraw-Hill Publishing Company, Inc.*

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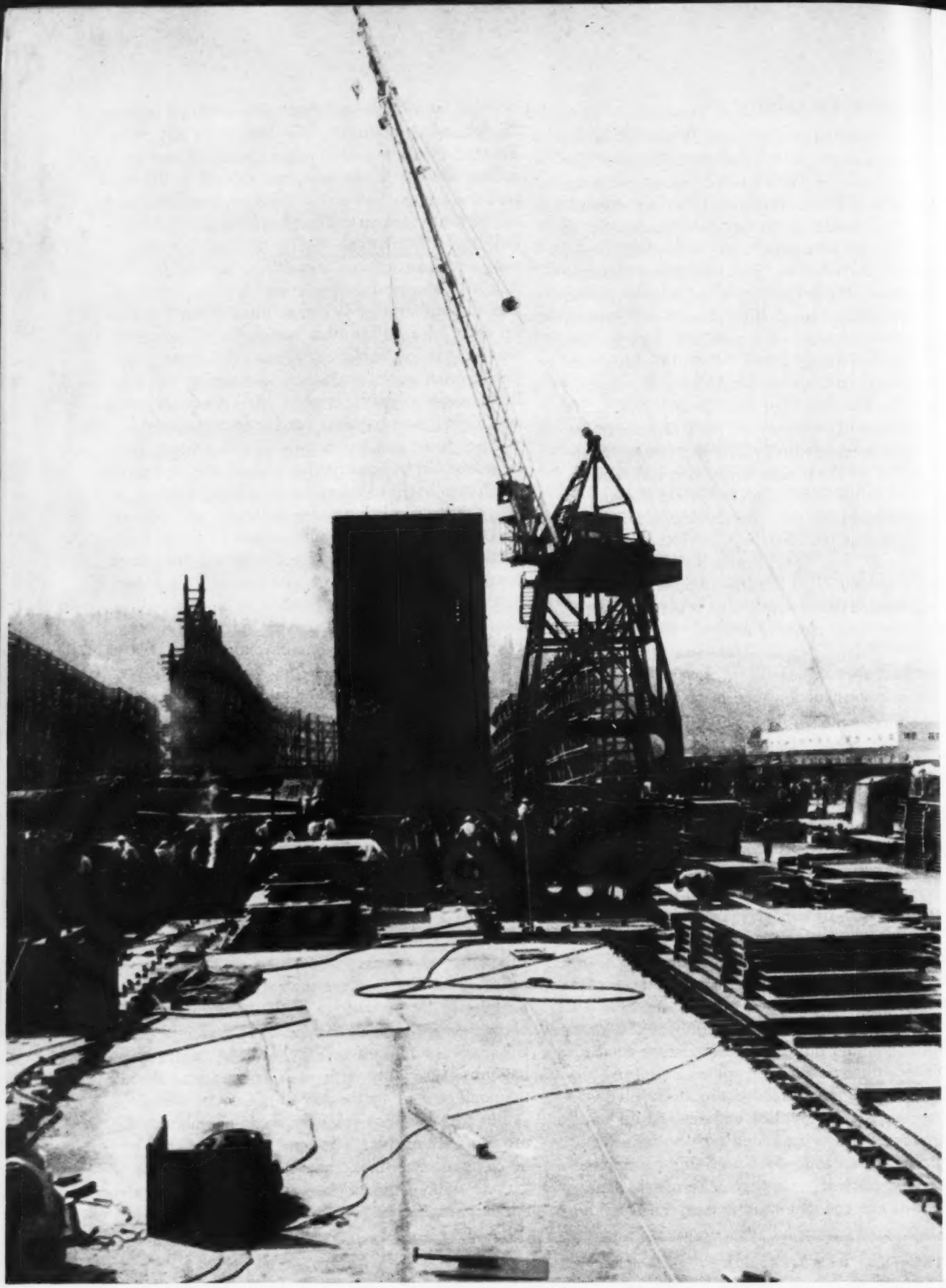


Basic technique of ship construction speed is prefabrication. Here, in the assembly area adjacent to the ways, a mobile, tower-mounted revolving crane turns a huge inner bottom section over to expedite welding on the opposite side.

Building Liberty Ships In 46 Days

***Contents in Brief**—EC-2 "Liberty" ships were originally scheduled by the Maritime Commission to be turned out in 105 days. By now all of the 18 yards building this type of ship have equaled or bettered this production rate, while the Oregon Shipbuilding Corp. got down to a 60-day rate in May, and early in June turned out a ship in 46 days. Features of this yard are ample areas for prefabrication of about 50 percent of the material "ahead of the ways"; the use of welding for nine-tenths of the connections; the assembly of inner bottom sections upside down to permit all downhand welding; and the use of traveling cranes to lift sections weighing up to 53 tons into place in the hulls. Much of both the personnel and equipment involved has seen prior service on construction jobs.*

As of June 1, the yard of the Oregon Shipbuilding Corp. near Portland, Ore., was turning out ships at four times the three-ship-a-month rate agreed upon in the original contract with the Maritime Commission. Some of this increase resulted from the addition of more ways, but one ship was turned out in 46 days compared to a 105-day schedule, and the general average was around 60 days. Such a record from keel laying to delivery of a 10,500-ton steel cargo vessel, 441 ft. long, may well be a milepost at which to make a survey of the remarkable methods and innovations (many of them developed by men from the construction industry) that have completely transformed the old and now out-moded methods of ship construction.

Adoption of the new methods did not come immediately. This was not possible because the new ideas had to grow out of experience. Improvement in yard arrangement, equipment and methods has been going on constantly, and even now, a year after the original layout of the yard, a radical change in yard arrangement is underway whereby a large, new assembly shop is being added to facilities that were good enough to break a world's record for speed.

The 60-day ship production rate is divided into 43 days on the ways and 17 days at the outfitting dock. At this pace this 11-way yard could deliver a completed vessel once every four days. Whether this speed can be materially increased is expected to be apparent by the end of July. By then the organization is expected to have found its stride on the stepped-up scale of operations, and the question of adequate deliveries in critical materials should be answered. (For comparison with other rates of ship construction, the average on 8,800-ton Emergency Fleet Corp. ships in the previous world war was 309 days, keel laying to delivery.)

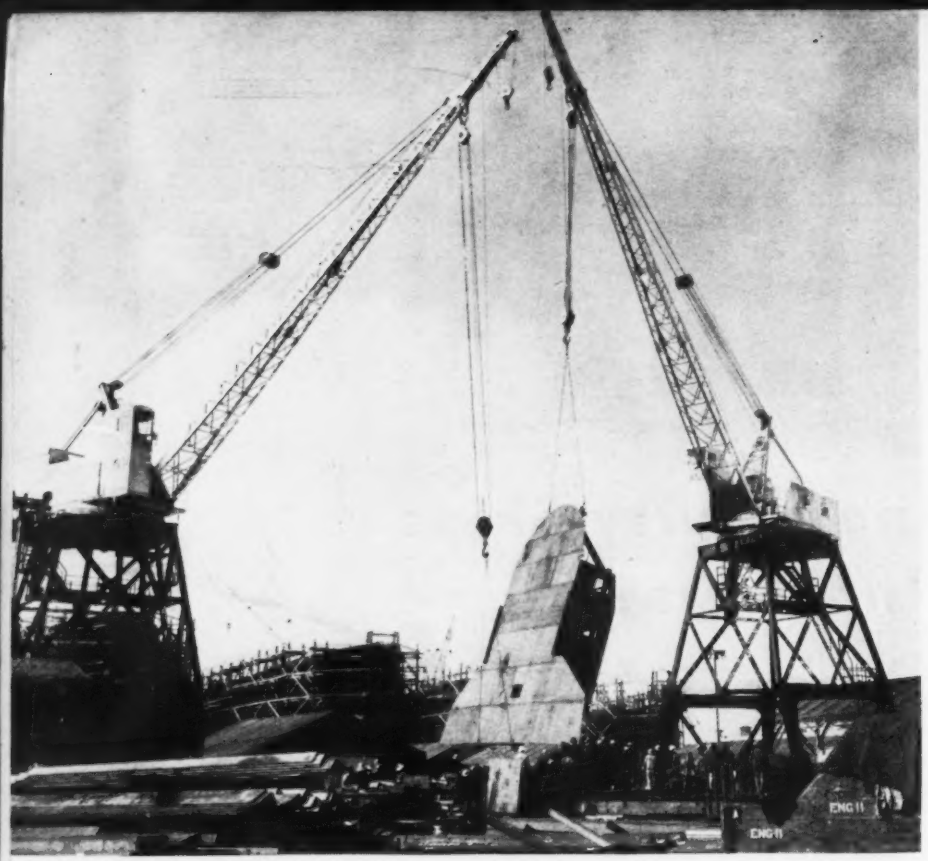
Major factors in this unprecedented speed are the large percentage of welded joints (in lieu of rivets) and the large amount of separate assembly of parts in shops and "areas" where necessary space and equipment can be utilized without interference with other operations. If all these operations were to be done on the hull itself, as they were in shipbuilding practice heretofore, only a limited number of men could be worked at one time on many parts of the job, and operations would be correspondingly slowed down.

Subdivisions of the yard

Even in a yard where operations were spread and dispersed on what at first seemed a generous space allotment, experience has shown numerous means of improvement leading to speed-up. This is typified by the increased efficiency and speed expected from the new assembly shop.

The new shop will be made up of eleven bays, and only certain parts will be assembled in each bay; in other words, operations will be departmentalized so that the workers can become specialists. Incoming materials will be received and stored at one end of each bay. The production line will move these materials through the bay as fabrication and assembly take place, and the assembled parts will be moved immediately into unroofed areas just beyond. Overhead cranes that operate in the bays extend outside the building proper to serve the storage and assembled-parts areas. The plan is to maintain either here or in the assembly areas at the ways sufficient assembled parts to forestall delaying work on the ways when the time comes for each individual part to go into the hull.

The first three bays of the assembly shop will be used exclusively for inner bottoms, bulkhead sections and other large parts. Here repetitive operations will be given the intensive study



Two 40-ton cranes team-up to lift a prefabricated deckhouse section and carry it forward to its final resting place on the ship.

possible where specialists concentrate on line production. In these bays the assemblies will be too large to be turned over within the bay and hence, when the time for turnover comes, will be moved by the overhead cranes to a place outside the shop within reach of the revolving crane. Originally, when it was planned to turn these parts inside the bays, overhead crane rail heights were planned on the order of 80 to 85 ft. By taking the parts outside to be turned over, a 42-ft. height of crane rail is adequate. The assembly shop structure is steel up to roof level and is roofed over with timber trusses 20 ft. apart.

Storage areas on the receiving end of the assembly bays are each laid out into subdivisions marked for the materials to be stored there. Under this arrangement even relatively inexperienced workers will be able to make a complete inventory in a few minutes with an accuracy that would have required hours of a foreman's time under the old system.

Two other centers of activity, important in the yard program, are the assembly areas and the plate shop. The assembly areas, one of which is located ahead of each launching way, provide at once ship-side storage and space in which to put on the finishing touches that can be done to advantage in this part of the yard. Prior to construction of the assembly shop, all assembly "ahead of the ways" was done here. However, parts for each hull were assembled in the area adjacent to that particular hull. With this work centralized in the new assembly shop, the same part for all hulls will be made in one bay only. Thereafter the assembly areas at the ways will be used for storage and supplemental work on assemblies.

In these areas, as in the bays of the assembly shop, there is provided, in lieu of floors, a supporting framework on which the steel parts can be rested, and where there is ready access to the underside as well as to the upper surface. This facilitates the welding which, under the present construction plan, has replaced nine-tenths of the riveting in these ships.

Usual construction for these elevated supports is a heavy timber framework surmounted by steel rails. Because of the temptation for workers not to retrieve tools, small parts, etc. dropped through this supporting frame to an uncovered ground surface, the new assembly shop has been provided with a concrete floor over the entire area. This floor underlies the 12x12-in. timber sills on which rest 10x14-in. stringers surmounted by 4-in. steel I-beams on 2-ft. centers. With this arrangement, designed for loads of 350-lb. per sq. ft., such operations as tack welding the underside of a large part can be readily carried on because the welders have easy access to all parts of the under surface. Work on the underside, however, is limited to minor items such as tack welding, attaching of temporary stiffeners, etc. Plate seams are made by the automatic welding process and the large assemblies are turned over to obtain the greater speed and efficiency that goes with this type of welding.

In the plate shop, plates are trimmed, cut and beveled on roller tables, rivet holes are punched or drilled, and a pantagraph with four oxy-acetylene burners on a cantilever arm makes it possible to cut four steel shapes simultaneously from a full scale paper drawing. The drawing or pattern is spread on a floor over which the governing point of the pantagraph can be moved. The steel plates to be cut are carefully placed under the torches and when the flames are ignited the governing point is

Assembly areas, just inshore of the launching ways, are separated by roadways used by gantry cranes and trucks. Plate shop is in the background.

guided by an operator over the paper pattern while each torch, adjusted by an attendant to maintain the flame at cutting efficiency, moves correspondingly over the steel plate. The operating mechanism and the support for both cantilever arms of the rig are carried on a small car that operates on a depressed industrial track between the pattern floor and the table supporting the plates.

Although punch presses are available in the shop for punching plates up to a thickness of 1½ in., a major part of the holes in even the light plates are drilled instead of being punched. Drilling can be done by one man operating a small portable drill, does not leave a burr on the underside of the plate, and can be carried on in as many separate drilling operations as there are small drills available. (Some of these portable drills have been built at this plant.) These advantages are in contrast with the larger number of workers required for using the punch press, the time involved in handling the plate, and the consequent bottleneck that develops around a tool that must be fixed in one spot.

In the plate shop, also, are furnaces for heating the channel irons which are shaped while hot to form the ship ribs or "frames". When these channels come, white hot, from the furnace, a deforming bar is first used to give the flange an opening or closing "bevel" after which the channel, still hot enough to be easily bent, is moved up against a template wedged to the floor and is bent by a pneumatic ram under the guidance of an experienced foreman, until the channel is curved to the desired shape.

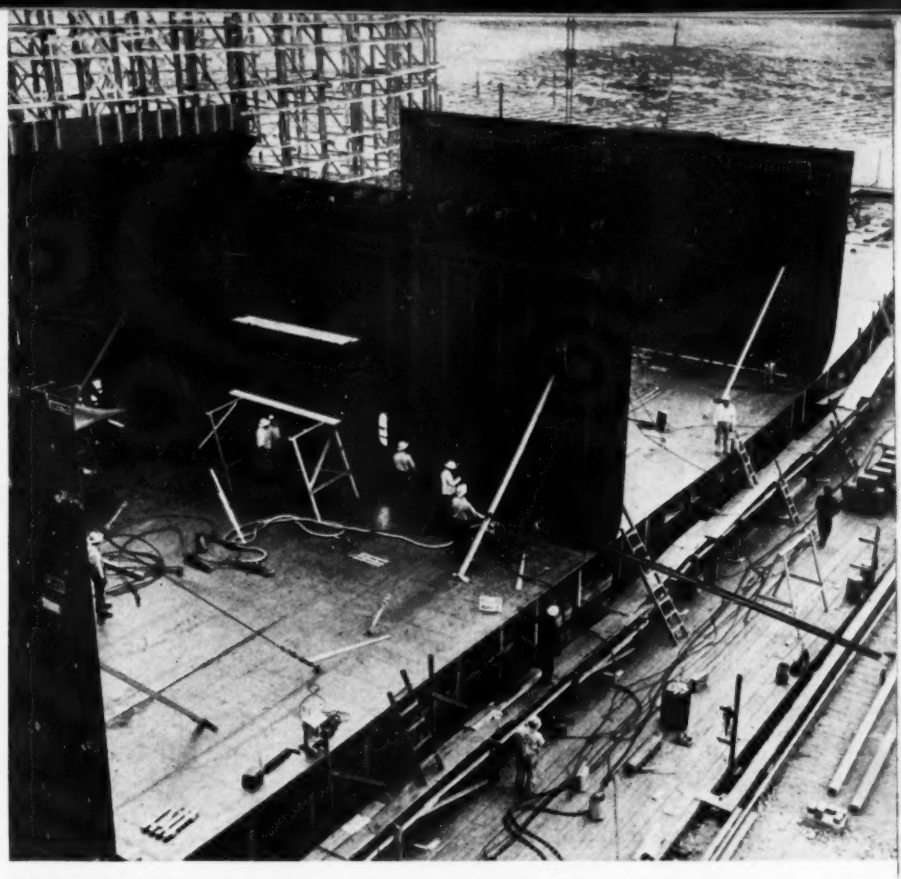
From the plate shop, materials flow in two directions—chiefly to the assembly shop but also to the assembly areas adjoining the ways and beyond these to the hulls themselves. Because the larger portion of the output goes to the assembly shop, a plate shop ordinarily is ahead of the assembly shop in a yard arranged for the ideal flow of materials. This sequence was not feasible at the Oregon Shipbuilding Corp. yard (where the assembly shop was decided upon long after the yard was built), and in place of this ample facilities for moving material are provided.

Standard gage railroad tracks connect all parts of the yard, trucks and trailers are available with capacities up to 60 tons, small loads of steel plates or parts are picked up by carriers (adapted from the overhead-powered type of vehicle known as "lumber carriers"), and for the heavier lifts there is generous provision of revolving cranes of 20 to 50-ton capacity on towers 30 to 60 ft. high.

Between the ways are revolving gantry cranes on 60-ft. towers that have a rated capacity of 42 tons at 40-ft. boom. These cranes run the entire length of the ways as well as along the adjoining assembly areas. Two adjoining cranes often combine to handle a particularly heavy part.

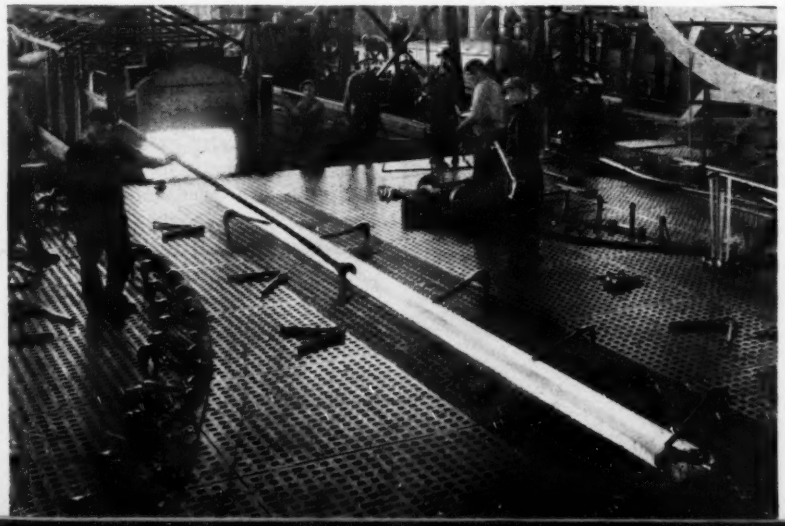
While welding the large inner bottom sections into place in the hull, there often is advantage in holding them down in place with heavy weights. For this purpose 20-ton concrete blocks are used, a considerable number of which are kept in the yard. Conveniently projecting loops of reinforcing steel make it easy to pick up these weights. They also are used for testing ship boom installations.

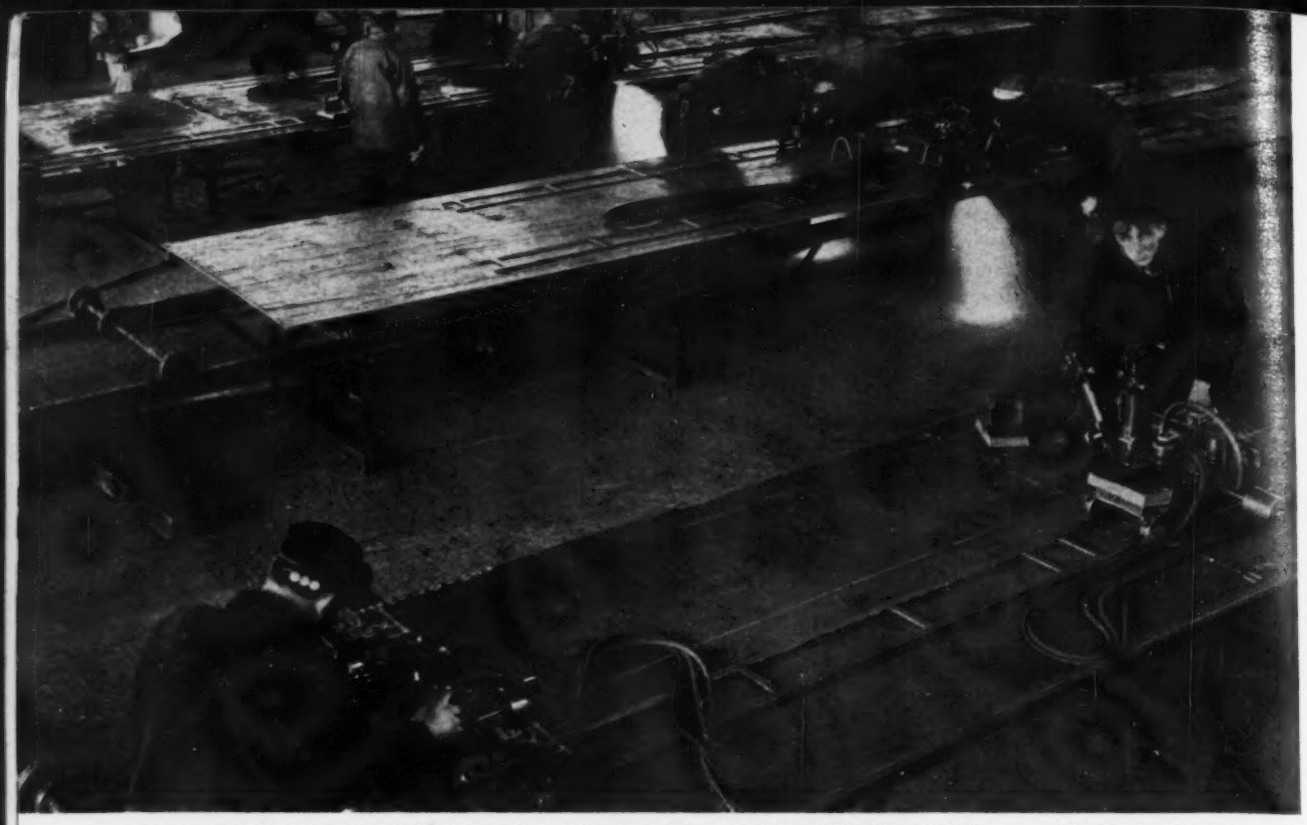
Six revolving cranes that serve the outfitting dock have booms that can reach not only the vessel moored next to the dock but can also deliver to a ship moored "two deep" on the outer side. Four revolving cranes serve the



A ship begins to take shape as the prefabricated bulkheads are spaced along the double bottom, welded thereto and braced.

A steel channel frame member undergoes the bevel-opening process after which it will be bent to the hull curve against the template at the left.





Trimmers cut steel in the plate shop with torches operating on guides. Note the roll tables on which the plates are moved.

plate storage area. Another, operating on tracks along the delivery end of the assembly shop, has a capacity of 50 tons at 60-ft. boom. The overhead cranes in the several bays of the assembly shop, all of 75-ft. span, have capacities of 25 tons in the first two bays where heavy parts will be handled, and 10 to 20 tons in the other bays.

Perhaps the most universal lifting service in the yard is performed by the truck cranes on rubber tires whose mobility enables them to go wherever they are needed. About 15 of these cranes of different sizes and capacities (such as could be obtained on short notice) constitute the utility fleet that handles plate in the storage yard, helps assemble parts that are added or are put together in the assembly areas, saves the time of the big revolving cranes, and avoids delays in many places where lifts have to be made on short notice.

About 50 percent of the steel tonnage in the ships is assembled "ahead of the ways." Also, nearly all of the separate units are put together before they go to the hull. Typical of this is the foundation and framework where the boiler assemblies are put together. Instead of working in a confined space down in the hull, this intricate assembly operation is done in a part of the yard readily accessible to materials and labor and where there is ample room for fitting and testing the parts. The completed 37-ton boiler assembly is then lifted to a 50-ton trailer and moved out to the assembly area at the head of the way. Here it waits for the revolving crane to pick it up and place it in the hull at the exact moment when its arrival will best fit into the assembly scheme.

With this general set-up the heaviest parts that have been handled to date are the 53-ton inner-bottom sections that are placed on the ship by two of the big revolving cranes working together. The afterdeck house is partially assembled to a weight of approximately 20 tons, which is placed on the ship by two cranes. This deckhouse pre-assembly plan could be carried much farther, and in a nearby yard, under the same general management, designs have been prepared for a deckhouse assembly program involving 200-ton lifts. There the yard layout was made for five deckhouses to be simultaneously under construction in a shop where they would move forward on a four-rail track in production line sequence. As a completed unit emerges from the dock end of the shop, it is to be picked up by two overhead bridge cranes working together with a 16-point support. The bridge crane span and height, as planned, are sufficient to permit lifting the deckhouse clear of the prow and, straddling the vessel, to move out along the outfitting slip until the deckhouse can be lowered to exact position on the hull.

Speed in production

The Oregon Shipbuilding Corp. recruited many of the key men in its organization from the heavy construction industry. Although there are a few men of long experience in ship construction, the greater number of executives were brought to the job in no wise hampered by precedent. They have devised shortcuts and methods of handling materials not heretofore standard in ship construction.

For example, an expediter follows each order for material from the time it goes to the Maritime Commission until the material arrives on the job. A control department watches and records progress of the material through the plate and assembly shops and to the ways. Each way superintendent indicates in advance what material he must have and what equipment he needs to handle it. These needs the control department checks, and materials and assembled parts are requisitioned in such a way as to avoid risk of delay on any of the ways.

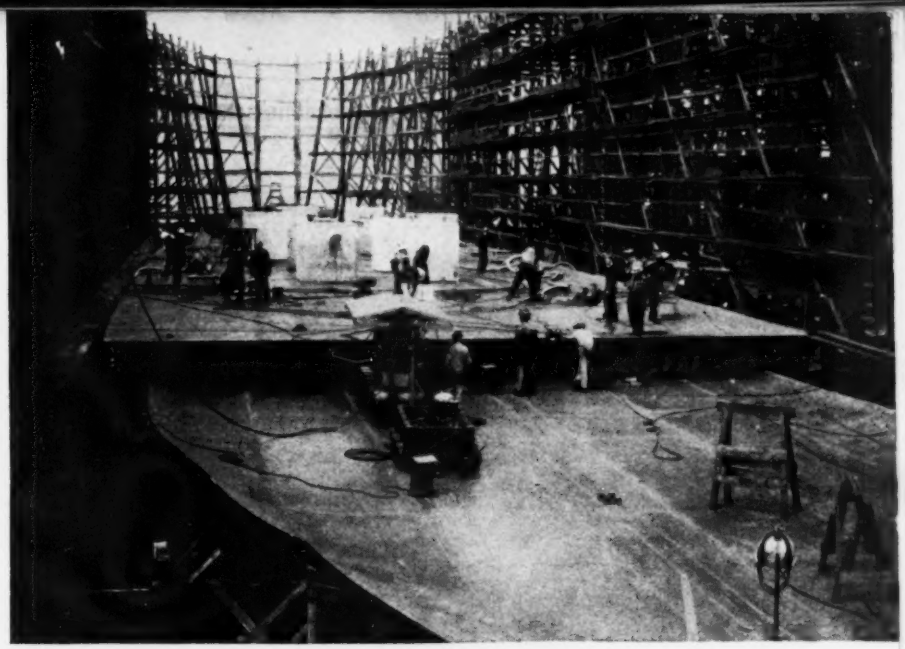
Under this system there is a constant check on the coordination of work in each part of the yard. The intent is to have the necessary stock of materials on hand and sufficient assembled parts made up in advance so that a minor delay or mishap in any assembly operation will not slow the process at some point farther along the line. This watchfulness over the flow of materials has proved highly effective in keeping operations up to schedule.

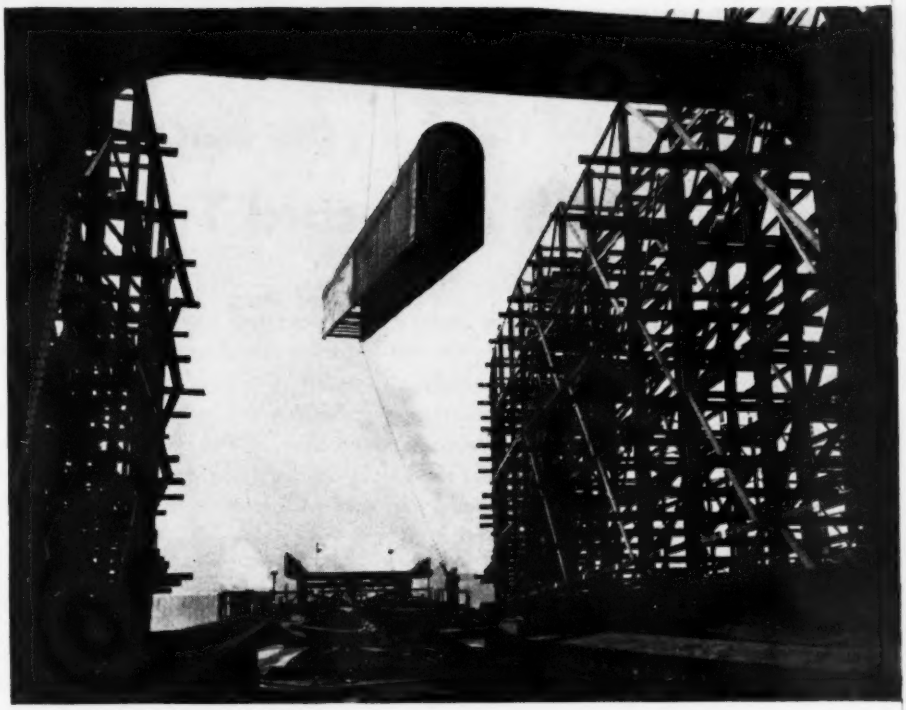
The Maritime Commission purchases all materials and undertakes to keep the necessary supplies delivered as the yard has need of them.

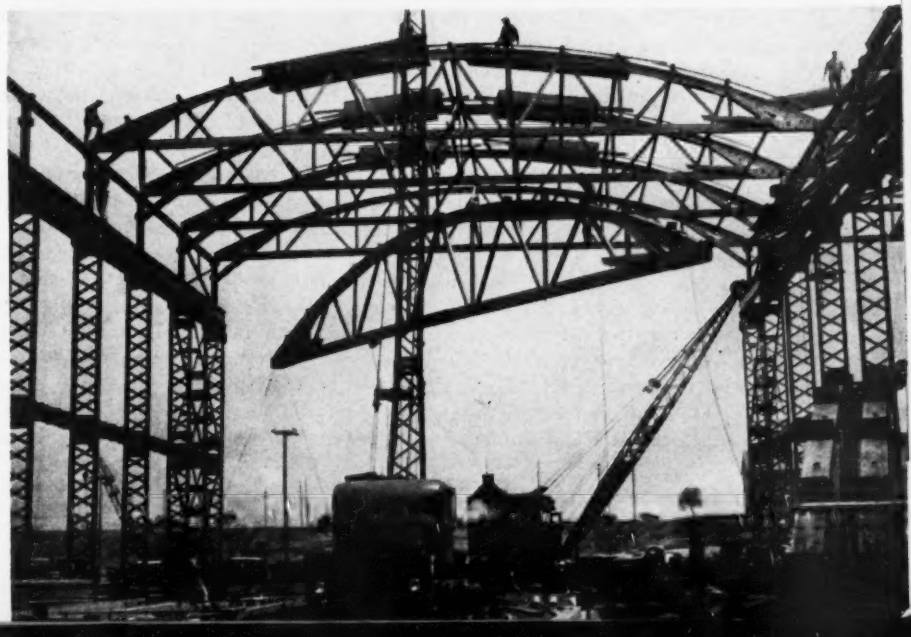
The orderly flow of materials through the various preparatory processes, however, is only half the problem. An equally important element in a yard where upward of 30,000 persons are employed, is the control and direction of personnel.

This yard works three eight-hour shifts every day in the month. Each worker gets one day off each week on a rotating schedule. Whenever that day off falls on a Saturday, he also gets the following day, thus having a two-day week end every seven weeks. This rotation of hours is arranged to avoid interference with crew operation by staggering the day-off allocations for key men. For example, each employee assigned the letter "A" begins with Monday as his day off in the first week, Tuesday the second week, and so on. The "B" employees start with Tuesdays off, and so on. An understudy, coached in advance, takes over the foreman's job one day a week, and the shift assignments are carefully supervised so that each of the three daily shifts takes over just where the preceding shift left off.

Edgar F. Kaiser is vice president and general manager of the Oregon Shipbuilding Corp.; Albert Bauer is chief engineer and assistant general manager; J. F. Reis is secretary and administration manager; Russell Hoffman is yard superintendent.







Shipbuilding and construction of new facilities go on simultaneously. At top, prefabricated inner bottom sections are being welded to outer bottom plates resting on the ways; 20-ton concrete blocks hold the sections down during welding. Center: Section of a propeller shaft tunnel 56 ft. long is lowered into position. Bottom: Erecting 77.5-ft. timber trusses for a new assembly shop.

In assembling prefabricated barracks for a mobile air depot, lag screws join walls to floor while bolts are used between adjacent wall panels.

War-Front Type Barracks Built in Record Time

***Contents in Brief**—Troop housing, now being built and projected, is much simpler than the barracks at the first large training camps. Speed in erection is a first consideration. One type, a so-called "theater-of-operations" design, is a single story tar-paper-covered structure reminiscent of the last war. Another, planned for even more rapid construction, is of prefabricated demountable type. Of panel makeup, assembled with bolts, lag screws and shear connectors, these buildings, on one job, were completed in three hours each by a crew of six men.*

THE CHANGE IN EMPHASIS from defense to offense which has been noted in military statements and plans since Pearl Harbor has also become apparent in construction activities. That it is now war and not defense construction is exemplified by the type of troop housing that has been undertaken, especially for small specialist camps in many parts of the country.

In one instance this consisted of a group of prefabricated demountable timber panel barracks which, in conjunction with demountable steel panel repair shops, will comprise a mobile air depot. Although in the field these depots will presumably be built by the troops themselves, this first one was let to contract. And if the speed here demonstrated is any criterion, complete facilities for airplane servicing and repairs and for housing the personnel can be provided in unbelievably fast time.

After making allowances for installing permanent utilities and building concrete floors for the latrines, which would not be a part of a field installation, the job boiled down to completing about seventy-five 20x120-ft. buildings in nine days. The job was finished in that time by working two twelve-hour shifts.

The contractor, M. M. Sundt of Tucson, Ariz., had just previously received commendation for building a "theater-of-operations" type camp for a railroad battalion of 850 men in two days less than a 30-day schedule, so that he and his entire crew were anxious to make even a better showing on the air depot job. The "theater-of-operations" barracks, however, were not prefabricated, being simple single-story tar-paper-covered buildings built of dimension lumber sawed and assembled in the field. They provided, therefore, little useful experience in carrying out the prefabricated barracks work.

With only a few minor variations, the prefabricated barracks are of the same design developed by the Federal Security Administration and used in a number of CCC camps. Foundations consist of 6x6-in. posts, about 3 ft. long, of which the lower 18 in. is dipped in creosote and set in the ground on footings consisting of 2x12 planks, also dip-creosoted. Installed on 10-ft. centers, the posts are joined by diagonal 2x4 braces and capped by the sills, which are made up of three 2x8's bolted together in the field through shop-drilled holes. Strips of heavy asphalt-impregnated paper are nailed on top of the sills to serve as water tables.

Floor panels, 5x10 ft. in plan and consisting of sub and finished layers, rest on the sills and the panels; sills and foundation posts are tied together by vertical 2x4 scabs spiked at each post. On the platform so formed the wall panels are laid upside down and then raised and attached to the floor by lag screws, and to one another by bolts. Wall panels consist of 2x4 framing covered by rustic channel siding and ½-in. fiberboard insulation separated by waterproof paper. The general size is 5 ft. wide by 7 ft. 3¼ in. high, an exception being two panels in each end wall which are 7 ft. 6 in. wide. About half of the panels come equipped with screened windows, and there are special panels for door openings and for the gabled ends of the buildings.

Roof panels are similar to the wall panels except for a covering of built-up roofing applied in the field and for a slightly larger size, 5x12 ft. The frame of the panels comprises the top chord of the roof trusses, which are assembled in the field from factory-cut-and-drilled members, using bolts and split-ring connectors. The trusses are 4 ft. 5 in. deep at the peak. All members are 2x4's, the bottom chord consisting of two such pieces assembled with split rings.

The contractor was given 24 days from the time the contract was signed

to complete the camp. Using a ditcher for the utility trenches, hand shovels for the holes for the foundation posts, and truck-mixed concrete for the latrine floors, the 1,000x2,500-ft. site was ready for barracks building operations in ten days.

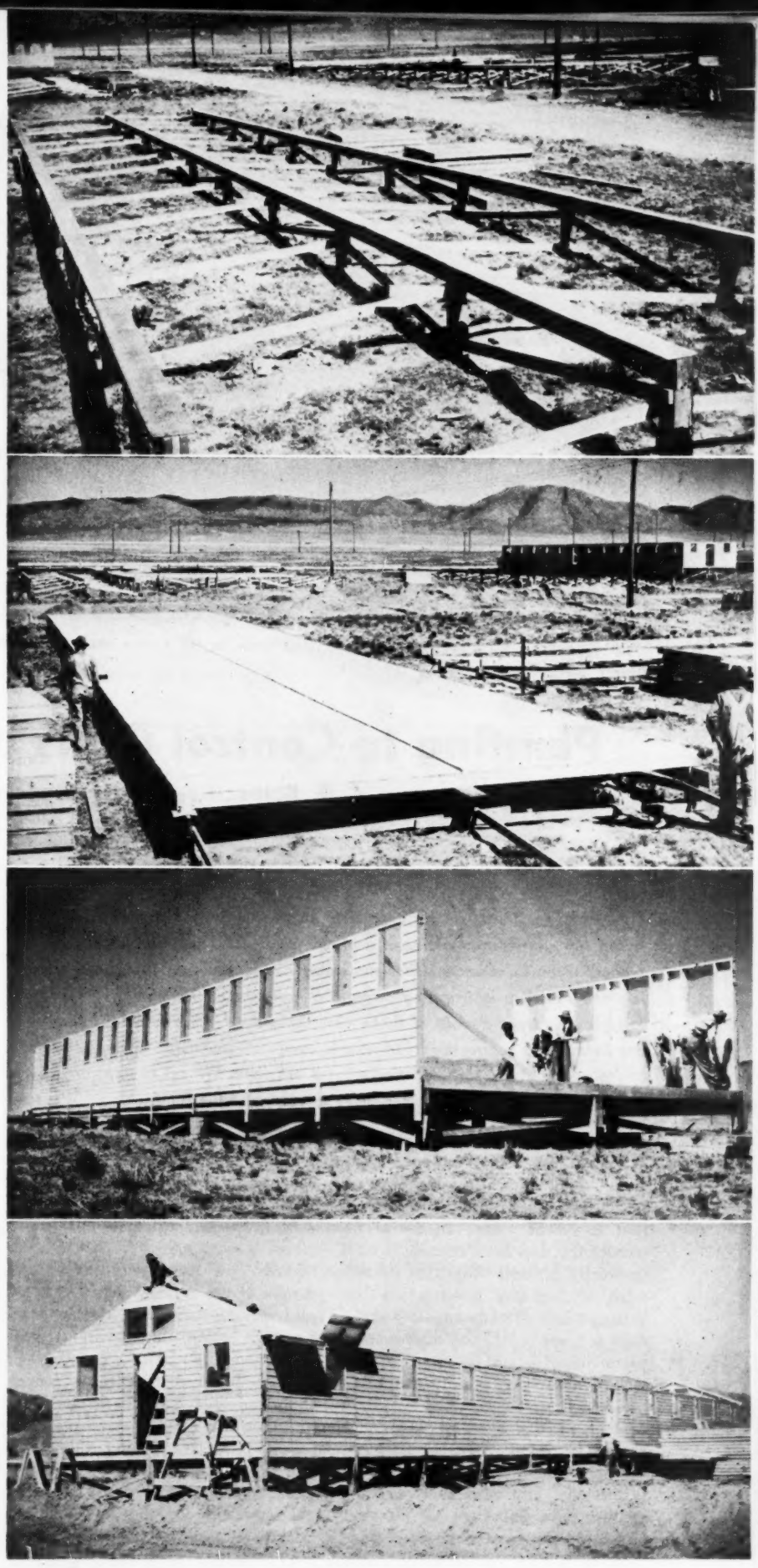
A gang of about 20 men set posts and installed sills and flooring. Given a couple of days start, they were able to keep ahead of the wall and roof gangs, of which there were four of six men each.

The units of a building were unloaded from the delivery trucks close to each building site so that no time was lost in sorting or moving units. Wall panels were lifted into place by two to four men, and temporarily supported by inclined braces running to cleats nailed to the floor. Two men installed the lag screws and bolts.

Roof construction was somewhat more difficult. First operation was to attach the web members to the bottom chord of a truss while it was on the ground. This assembly then was raised into position on the walls and attached by clip angles, men standing on saw horse platforms meanwhile. Next the longitudinal ridge pole was erected on temporary posts, and raising of the roof panels got underway. This also was done manually by men standing on temporary platforms supported by the bottom chords. As soon as two opposite panels butted against the ridge pole, the web members of the trusses were bolted to the purlins of the panels and the assembly was complete.

Eight buildings per day—one every three hours—were completed in this manner, and the camp was ready for occupancy on the scheduled date. The speed with which the camp was built and the good facilities for living and working that it provides will be welcomed by airplane service crews, many of which are now operating under primitive and inefficient conditions on battlefronts in many parts of the world.

The camp described in this article was built in the Albuquerque district of the Corps of Engineers, Lt. Col. L. Rosenberg, district engineer.



Six men erect one of these prefabricated barracks in three hours. Note in the top view the use of strips of roofing felt for water tables over the sills, and in the third view how wall panels are attached to floors and posts by vertical scab pieces.

Fig. 1. Even a very young windbreak stops snow in the Plains country, and the snow supplies moisture for the trees.

Planting to Control Drifts on Highways

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***Contents in Brief**—More extensive planting of trees and shrubs is proposed for prairies and plains of northern states as a substitute for slat snow fences. Profiles of snow drifts show that a single row of low, dense shrubs is more effective in trapping snow in a limited belt than a 17-row belt of tall-growing trees devoid of limbs near the ground. Hardy shrubs and trees are listed with suggestions for several types of planting. Soil preparation and planting are described. Earlier cost estimates are cut in light of experience gained in planting shelter belts to protect farmsteads.*

PLANTING OF TREES AND SHRUBS along highways, chiefly for beautification, has received increasing attention in recent years. In a few instances this has been combined with snowdrift control. Now that curtailment of highway construction has been put into effect to conserve materials for war work, the highway departments of northern states are provided with an opportunity to restudy the subject of planting for snowdrift control in the light of knowledge gained in recent extensive plantings for shelter-belt purposes to protect farmsteads, minimize snow drifting against farm buildings or into feed lots, to protect crops or to check wind erosion. Much literature on this subject now is available. Information relating to planting to protect highways in specific regions of the United States is more meagre, especially as regards the species of trees and shrubs to use and the actual type of snow profile formed by tree belts of varying width, composition and density.

It is believed that snow fences composed of trees and shrubs may, in many instances, be employed with a total cost not greater than slat-fences, although this will depend a good deal on the necessity for purchasing land for the tree belt, as against the possibility that the farmer with abutting land may sanction the planting if he is given an interest in it. Snow fences or "traps" formed by trees may be somewhat too rigid in pattern for the best aesthetic effects, but, in the windswept plains where most needed, *any* trees give relief to the landscape. It is our feeling that a good deal of purely ornamental planting which is being done along highways, is eventually going to create additional problems in snow removal and maintenance as the trees develop; that some of this planting is rather costly and does not show up very favorably considering its expense; and that in many instances greater public benefits will accrue by use of a part of these funds for planting of snow traps.

Snow profiles formed by plantings

To determine the type of snow profiles formed by trees and shrubs, a series of shelterbelts in North Dakota was cross-sectioned for snow profiles from 1937 to 1939. The shelterbelts were from 1 to 19 rows in width and embraced a wide range of

ages, species and densities of planting.

The profiles and shelterbelt cross-sections are presented in the accompanying figures. Except as indicated, they were taken March 10 to 12, 1939. In each case the upper graph shows species used, their comparative height, density and age, as well as orientation, and directly below it is the snow profile of that belt. Practically all of the belts were located on large fields which had been in wheat the previous season, and which because of close harvesting left a condition conducive to poor snow storage by the stubble and a maximum of snowdrifting.

The first three belts given in Fig. 2 are golden willow, which when young makes a very satisfactory snow trap even as a single row. It is apparent that a dense low growth near the ground line is the ideal character of a plant for trapping snow near the barrier.

Fig. 2D represents a type of planting which is quite effective on almost any droughty upland soil in the plains. It will be noted that the taller green ash trees seemed to aid in depositing more snow on the windward side of the belt than occurred with most of the belts.

Fig. 2E is a cross-section of a belt which is good for farmstead planting in the Great Plains except that the isolated row of lilac (Row 10) is not necessary or might have been more logically substituted for the row of gooseberry.

The profiles in Fig. 3 are in contrast with those in Fig. 2. They are representative of all older belts ranging from 25 to 40 years of age. The tendency in these windbreaks is to allow snow to drift through the lower part of the barrier, which in the older belts of cottonwood or boxelder were devoid of limby growth, and the resulting snow deposition was a rather even layer from 10 to 20 in. deep extending out to a distance of 600 to 1,000 ft. beyond the trees. The deposition of the snow in an even sheet is of benefit from an agronomic viewpoint, but certainly is not desirable from a highway protection viewpoint. Plantings of the type shown in Fig. 3 are, therefore, to be avoided.

Fig. 4 illustrates several multiple-row belts containing two or more species. The belt in Fig. 4A has a snow trap located between two narrow strips of trees and shrubs. Fig. 4B represents a design which would have been more effective had there been a more symmetrical arrangement of the shelterbelt cross-section and had the trees been cut back to promote growth of limbs near the ground line. Fig. 4C represents a somewhat more effective belt. It is wider than necessary for a highway snow trap.

To determine how snow accumulated in tree belts through the winter months and how it varies from one year to the next, several snowdrifts were profiled at one to two-week intervals. In all cases the drifts accumulated much in the manner of a shifting sand dune and reached a peak height in late February or early March.

Fig. 6A is a double row of Siberian pea and represents a good design for a cheap yet effective highway snow trap. A belt of this design can easily store six to eight times the maximum amount of snow recorded for Feb. 17, 1939, and still keep the entire accu-

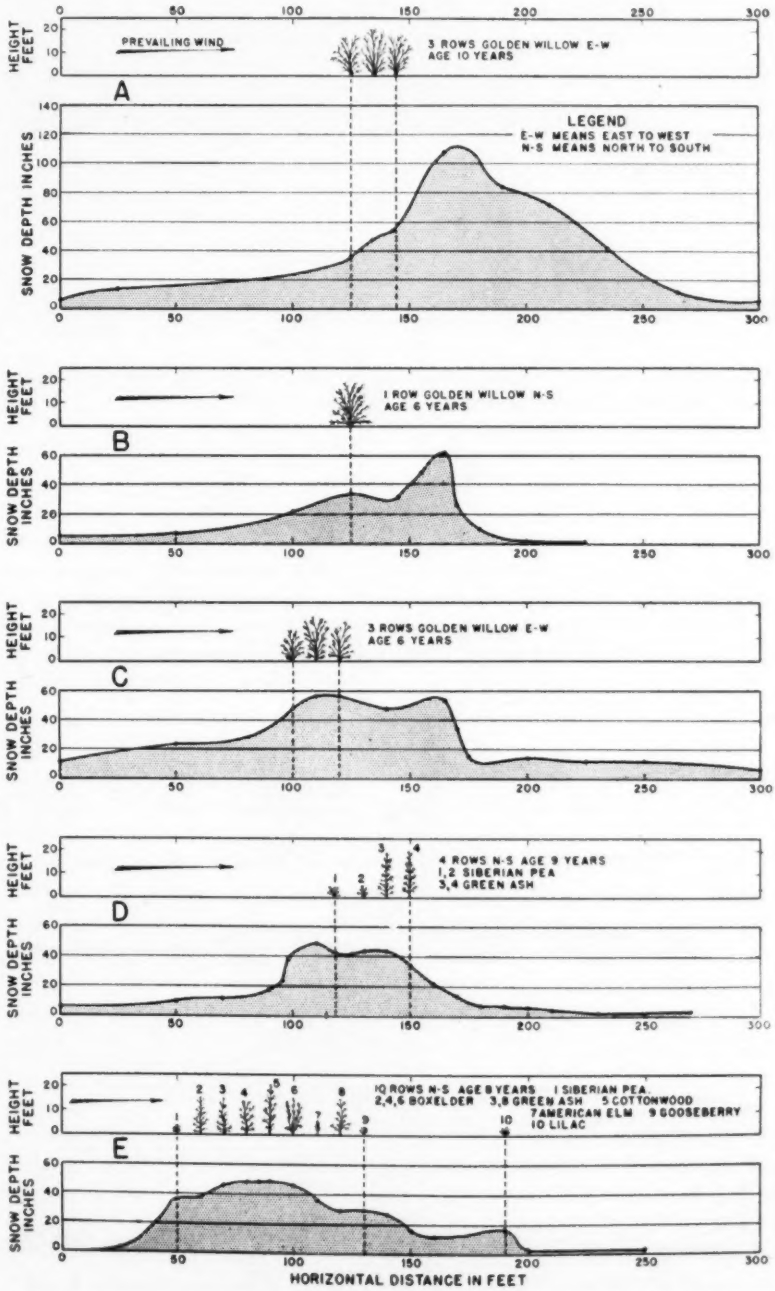


Fig. 2. Ideal snow profiles formed by young windbreaks of shrubs and trees. These were taken in North Dakota in March, 1939.

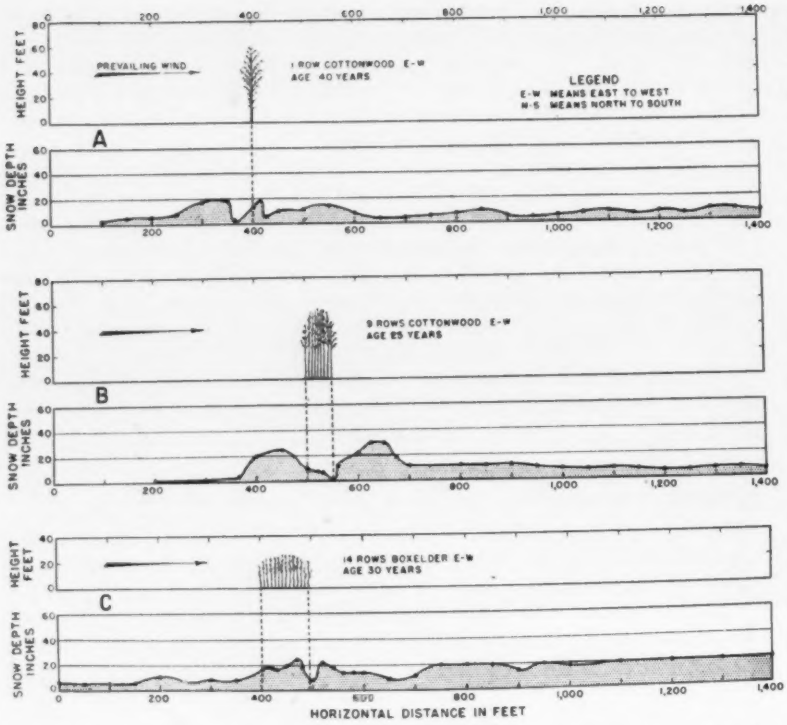


Fig. 3. Snow profiles formed by tall-growing types of tree belts with poor density near the ground. This type of planting is to be avoided.

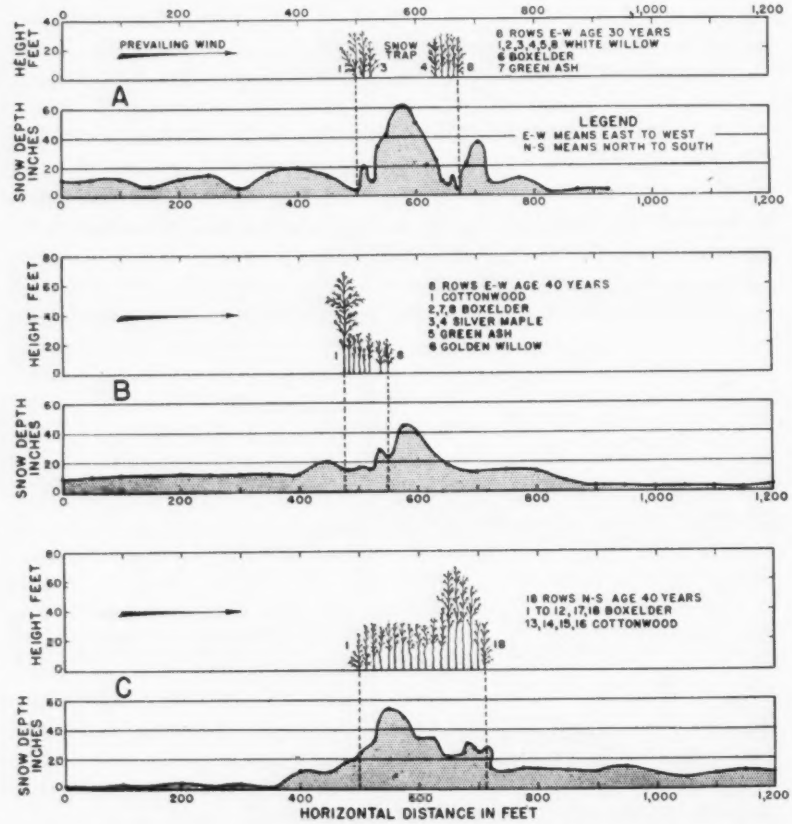


Fig. 4. Snow profiles in multiple-row shelter belts in North Dakota. The lower profile shows planting wider than necessary for highway protection.

mulation within 80 to 100 ft. of the first shrub row on the windward side.

Fig. 6B is an example of a very effective snow fence planting and indicates that the general type of drift formed in different years, 1937 and 1939, respectively, is similar as regards shape. In 1937 snowfall was heavier, resulting in a larger drift.

Best species for snow fence

To be most satisfactory for snow traps, the species used should be low-growing, dense near the ground line, frost resistant, drought hardy, fairly free from serious insect or disease pests or from attack by rodents, adapted to a wide range of soils, and reasonably long-lived. The ornamental value of the wind-breaks, resistance to snow breakage, cost per mile of snow fence, and their possible value for cover and food for wild life are also important considerations.

In order to bring together the best information on this subject, the species found by actual trial and observation to be best adapted to the Northern Great Plains, especially North and South Dakota and the prairie areas of the adjoining states of Minnesota, Iowa, and northern Nebraska, are listed in the accompanying table.

Just how effective Chinese elm will be in the long run is not known, and it might well be used sparingly. The other types of trees and shrubs listed have demonstrated their value quite satisfactorily over a period of years. A few other species could be given, but they do not grow well throughout the entire area and can best be dealt with separately. In western Minnesota and Iowa, Black Hills spruce and northern white spruce have proved fairly good, although they do not appear to be as hardy as the Colorado blue spruce. In western Iowa, the Austrian pine, and to some extent Douglas fir, have also been fairly satisfactory. From the viewpoint of making a satisfactory snow trap, a single row of dense low-growing shrubs like Caragana is quite satisfactory, but from the standpoint of maximum effectiveness, two or more rows are desirable. The chief advantage in using more than one row is that more species can be used and this in itself provides a safety factor for certain types of damage; also, if gaps occur in a multiple-row belt they are more likely to be staggered and not create openings clear through.

The use of two or more rows is likely to create a higher aesthetic value.

Care of live snow fences

It is vitally necessary that the soil have good moisture conditions at time of planting. Areas that have been in sod should be summer fallowed for at least a full year before planting and in some cases may require two years to thoroughly rot the sod and get the soil in shape for planting.

Summer fallowing might well be recommended, even for areas which have been used for production of crops such as alfalfa, clover, corn or wheat, especially when soil moisture does not seem to be abundant to a depth of at least 3 or 4 ft.

All information available, including the accompanying snow profiles, indicates that the snow fences should be planted with the first shrub row on the windward side at least 80 to 100 ft. from the edge of the road, or from the top of the road cut if the cut is more than 2 or 3 ft. deep. This distance will give storage space for the heaviest snows that fall in the northern plains and prairies.

For good results at minimum cost, broadleaf trees and shrubs should be one or two years old, with the latter age much preferred for all species listed in the table, except boxelder, Chinese elm, and perhaps Russian olive, which are fairly satisfactory as one-year-old seedlings. The conifers, when planted as bare-root stock, have shown best results when transplant stock from three to five years old is used, at which time the trees are from 6 to 14 in. high and have a well-developed, fibrous root system.

Nursery stock is classified by the years grown in the seed bed and year in the transplant bed. Thus a 2-1 tree was two years in the seed bed and one in the transplant bed. Junipers have given good result with 2-1 stock, although 1-2, and 2-2 stock have also shown good survival and growth. Spruces do best as 2-2, 3-2, or 2-3 stock. Ponderosa and other pines have shown best survival when 2-1, 2-2, or 1-2 stock was used.

Somewhat higher survivals in evergreens probably can be obtained by using balled and burlapped trees ranging from 1½ to 3 ft. in height, but the initial cost of such stock is very high and planting costs are prohibitive for snow fence purposes. Such large stock may cost from $1 to $3 per tree, whereas plenty of bids can be obtained on young bare-root transplants at 2 to 5c. per tree, providing they are purchased in large lots.

Fig. 5. A two-year-old shelter belt bordering a highway in the level country of eastern South Dakota.

Planting is done exclusively in the spring of the year. One man in an eight-hour day can plant from 300 to 600 trees. If a subsoiler is run down the row previous to setting the trees, planting speed is stepped up very appreciably and in heavy soils may be doubled. Planting is usually done with a shovel but in recent years the extensive government shelterbelt plantings have employed machines with substantial savings in cost.

After the trees have been planted, it will be necessary to cultivate them for a period of at least four to six years and any belts with conifer rows will need cultivation for as long as eight or ten years, since good cultivation is the key to successful tree growing in prairie regions. Other items of cost will be fencing against livestock, rodent control, removal of Russian thistle and tumbleweeds from the belts, and cutting back of shrub rows to stimulate branchy growth.

Costs of planting snow fence

Considerable data on cost of planting snow fense were given by E. A. Finney in an article on "Snow Control on Highways" in *Public Works*, October, 1936. That paper indicated

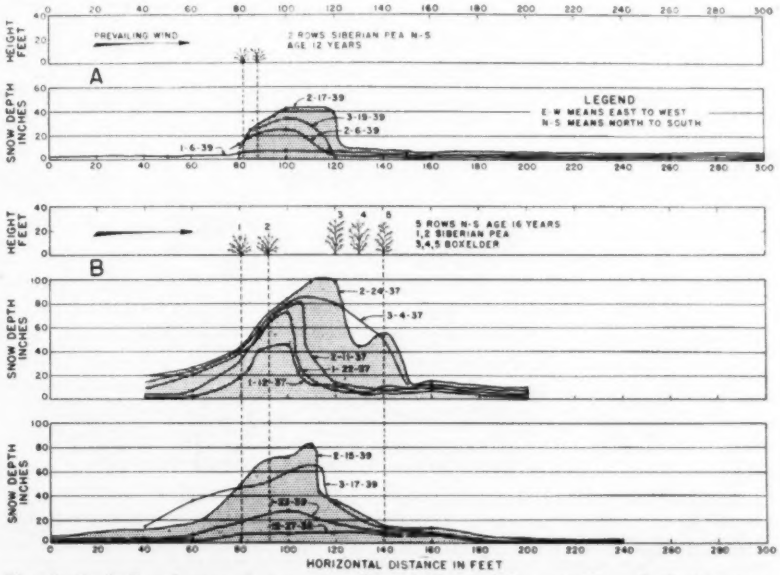


Fig. 6. Periodic changes in snow profiles during winter months. A double row of Siberian pea, as shown at the top, is both cheap and effective for highway work. Its cost closely approaches that of slat snow fence.

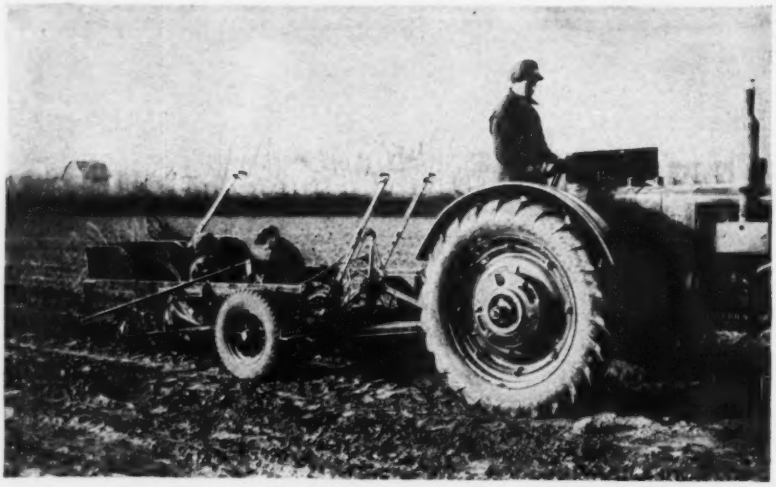


Fig. 7. Tree-planting machine built by the Forest Service for shelterbelt planting. Three men operating this machine plant about as many trees as a 12-man hand planting crew. The machine plants about 8,000 trees during a normal eight-hour working day. It reduces planting costs materially.

that $2 per lineal foot of belt is an average initial cost figure. These costs can undoubtedly be slashed tremendously, as has been demonstrated in the shelterbelt program of the Prairie States Forestry Project, by using somewhat smaller nursery stock such as two-year-old deciduous seedlings and three to five-year-old conifer transplants. Also, costs can be cut by using a comparatively large percentage of deciduous trees and shrubs which are cheaper to produce and plant, and more adapted to the rigorous climate of the region. Moreover, the deciduous stock does not need the intensive care for as long a period as the evergreens.

SHRUBS AND TREES SUITABLE FOR PLANTING AS SNOW FENCES

Number of rows in belt	Type of windbreak**	Winward ← Choice of species by rows* → Leeward			
		Row 1	Row 2	Row 3	Row 4
1	Shrub	Caragana Chokecherry Honeysuckle American plum			
2	Shrub, shrub.	Caragana Chokecherry Lilac Honeysuckle American plum	American plum Chokecherry Russian olive Buffaloberry		
2	Shrub, evergreen.	Caragana Chokecherry Lilac Honeysuckle American plum	Rock Mountain red cedar Eastern red cedar Colorado blue spruce Ponderosa pine		
3	Shrub, low tree, shrub.	Caragana Chokecherry Lilac Honeysuckle American plum	Green ash Boxelder Hackberry Chinese elm American elm Burr oak	American plum Chokecherry Russian olive Buffaloberry Lilac Honeysuckle	
3	Shrub, low tree, evergreen.	Caragana Chokecherry Lilac Honeysuckle American plum	Green ash Boxelder Hackberry Chinese elm American elm	Rock Mountain red cedar Eastern red cedar Colorado blue spruce Ponderosa pine	
4	Shrub, low tree, low tree, shrub.	Caragana Chokecherry Lilac Honeysuckle American plum	Green ash Boxelder Hackberry Chinese elm American elm	Green ash Boxelder Hackberry Chinese elm American elm	American plum Chokecherry Russian olive Buffaloberry Lilac Honeysuckle Caragana

* Any one of the three or more species can be selected for any well-drained, nonalkaline soil, ranging in texture from loamy sands to clay loams. Soils with coarse gravel subsoils and shallow topsoil should be avoided. Where it is necessary to cross low spots, plant 1-year-old rooted cuttings of Russian golden willow. Evergreens, especially spruce, could well be limited to a line east to the 100th meridian of longitude.

** Spacing between rows can range from 6 to 10 ft.. Spacing between plants in the rows should be as follows: All shrubs in Row 1 should be 2 or 3 ft. apart; all shrubs in Rows 2, 3, or 4 can be from 3 to 4 ft apart; all low broadleaf trees in Rows 2 or 3 should be 4, 5, or 6 ft. apart. All evergreens should be 4, 5, or 6 ft. apart in the row, and 12 to 16 ft. away from tall-growing trees like boxelder or elm. These spacing recommendations are contingent upon the assumption that any dead plants will be replaced.

On the basis of cost estimates of extensive shelterbelt plantings in the Great Plains, after making suitable adjustments in adapting them for highway snow fences, the cost for such planting will range from 20 to 75c. per 100 ft. per year. This is based on all estimated initial investments and maintenance costs prorated over 40 years, which is an estimated average effective life of the shrub snow fences.

Since the present system of using slat-wire snow fences costs about 25c. per 100 ft. per year, it is probable that the simplest type of plantings, consisting of one or two shrub rows, might cost no more over a period of years. Those belts in which evergreens are used, or which consist of three or four rows, will probably cost up to 50 or 75c. per year per 100 ft.

One factor which may be an obstacle to more extensive planting of tree and shrub snow traps is the question of lease, purchase, or easement of farm land adjoining highways. The experience of the Prairie States Forestry Project might well be cited as opening a possible approach to the problem. Under an agreement between the U. S. Forest Service and the landowner, the Forest Service has furnished the nursery stock, planted it with WPA labor, and provided some labor for aftercare such as hand hoeing. The landowner plows the ground, summer-fallows it in some cases, furnishes the fence material, and does the cultivation. No payment is made for lease of the land, because ownership of the tree belt is vested in the farmer. The tree belt in time becomes effective in wind-erosion control, or in protecting farm land from hot summer winds, and the owner is entitled to any products such as fruit, material from thinnings, and, after the belt reaches maturity and begins to die out, the fuel and post material.

Kansas recently passed an act which entitles owners of land used for the planting of windbreaks adjacent to public highways to a reduction of 80 percent of the assessed valuation of the land so used when computing taxes.

The Lake States Forest Experiment Station which conducted the studies reported herein is maintained by the U. S. Forest Service at University Farm, St. Paul, Minn., in cooperation with the Division of Forestry of the University of Minnesota.

Laminated Timber Beams

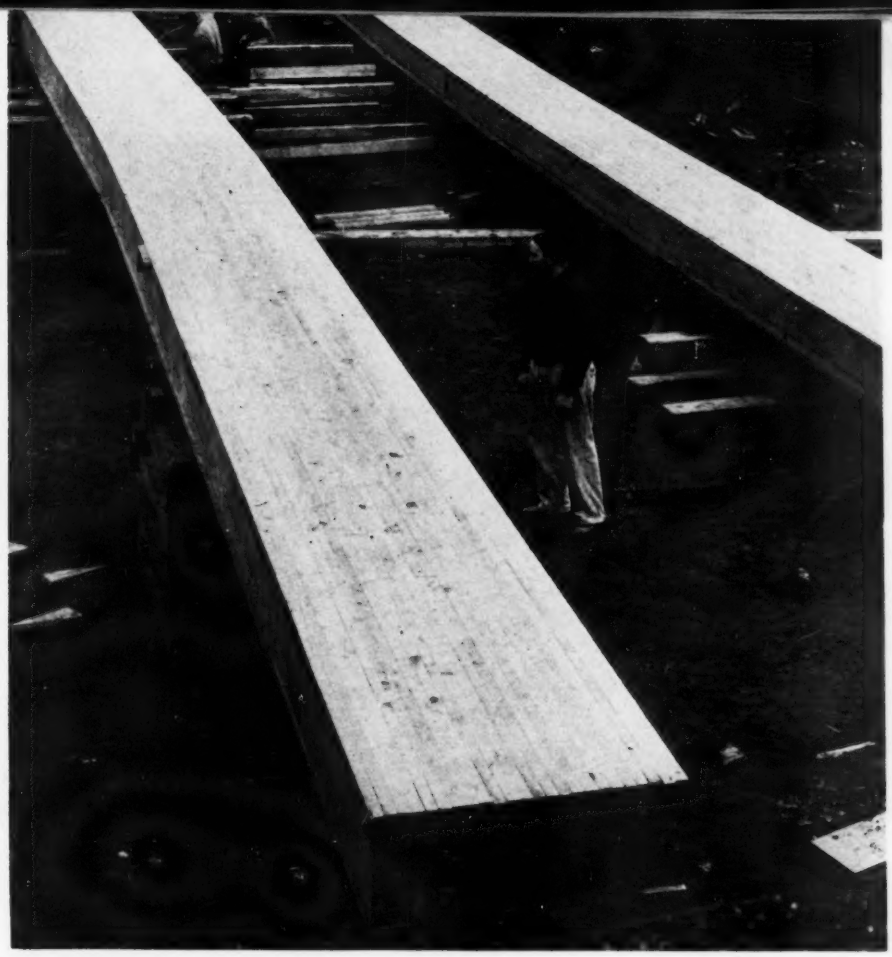


Fig. 1. The laminated beams ready for placement. Despite the appearance of having considerable curvature, the camber in the beam is only 3 in.

WARTIME STEEL SCARCITY which has drawn attention to glued, laminated timber beams, resulted in selection of this type of construction for a gymnasium in the new Recreation Center at Yesler Terrace in Seattle. The span here required was 67 ft. 2 in. By use of the timber beams some 20,000 lb. of steel was saved in addition to a cash saving. The actual cost of the timber beams in place was $152 less ($76 for each beam) than the estimated cost for steel girders. (A laminated timber beam 110 ft. long was described in (*ENR* April 11, 1940, p. 489.)

Each beam in the new gymnasium is 14 in. wide by 40 in. deep, built up of 3,900 b. ft. of 2x4 and 2x10-in. seasoned lumber. Two species of wood were used, Douglas Fir and Sitka spruce. The Douglas Fir, chosen for its strength, was placed in the outer edges of the beam where the stresses are highest; the spruce, of considerably lighter weight, was used in other portions of the beams.

The beams were fabricated with butt joints on the inner laminations and scarfed joints in the outer layers. The glue, of which 135 lb. per beam was used, was of the self-bonding type for which sufficient pressure is obtained in each glued joint by the nailing operation for which 20 d. nails were used. Both beams were put together with 3-in. camber of which only about ½ in. came out as the result of dead weight when the beams were set in place. A full snow load on the roof would still leave 1 to 1½ in. of camber. Five and a half days were required for assembly of the two beams which were delivered from mill to job by logging trucks.

The joint spacings in adjacent laminations were required to be not less than 40 times the lamination thickness with butted joints, and not less than 25 times the thickness with scarfed joints. All the material used was 1⅝ in. thick, the net dimension of 2-in. lumber surfaced on both faces.

The beams were manufactured by Attwell Construction and were put together with Laucks construction glue. J. C. Boesplug Co. was the general contractor.

(Believing that the foregoing should be supplemented by some general information on design of laminated timber beams, C. J. Hogue, engineer, West Coast Lumbermen's Association, was asked to supply the data. Mr. Hogue's comments follow.—EDITORS)

Sizes and lengths—A glued laminated beam or arch of almost any desirable size or shape can be fabricated from material of sizes and lengths usually available in any lumber yard. Smooth surfacing is essential for good contact. Either vertical or flat grain is satisfactory; one or the other should be used throughout the beam to avoid internal stresses from unequal swelling and shrinking. Unit stresses should be the same as in the individual pieces of lumber used, except as reduced for curvature of arches.

Moisture content—The moisture content of timber to be glued should be the same, as nearly as possible, as that at which it will remain in the structure where it is installed. This will avoid internal stresses from swelling and shrinking. Actual moisture content is less important than is uniformity and equality with service conditions. Generally speaking, moisture content should be below 18 percent.

Beam and arch requirements—Sizes of lumber to be used depend largely on whether a beam or an arch is required and, if the latter, the radius of curvature. For a beam it is economical of glue and labor to use pieces as thick as possible. A 2-in. thickness is the most practical dimension for seasoning to the desired moisture content and hence, 2-in. lumber (1⅝ in. after double dressing) is generally used.

In an arch, the maximum desirable

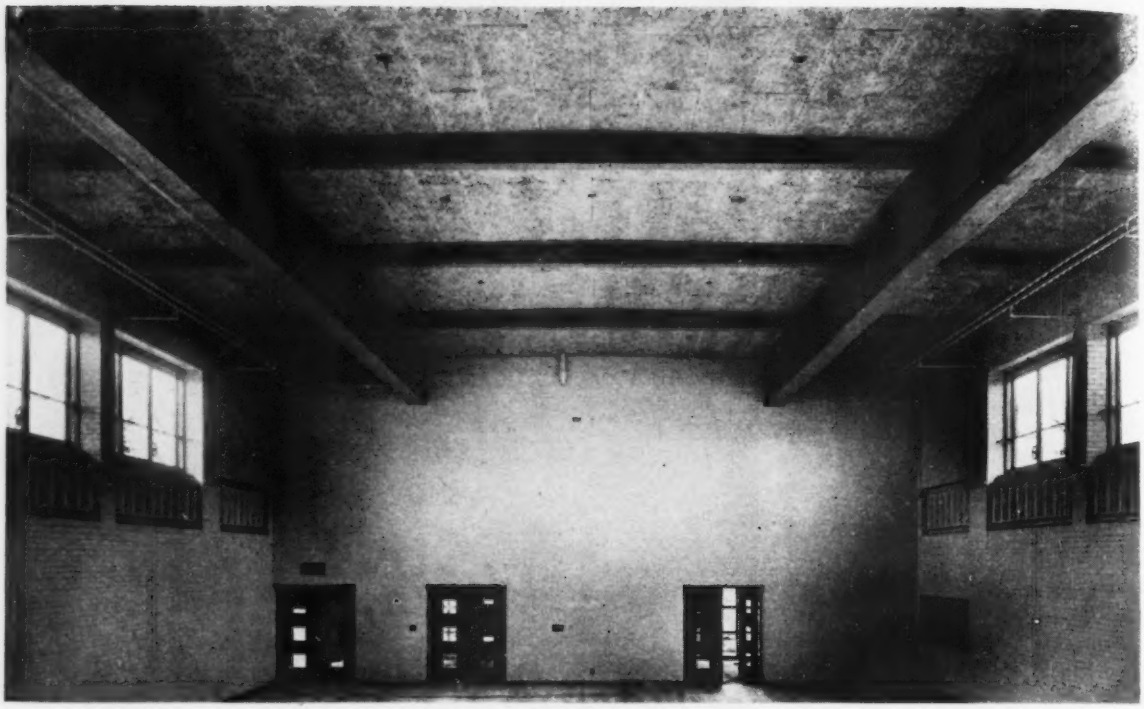


Fig. 2. The two beams in service in the Recreation Center gymnasium. The saving in steel amounted to 20,000 lb.

thickness of a lamination is 1/150 of the radius of curvature. Initial stresses from bending into a curve adjust themselves to a considerable extent after gluing. If the thickness-to-radius ratio is kept at 1 to 150, or more, the original strength will be reduced only about 8 to 10 percent. A maximum thickness-to-radius ratio would be about 1 to 100. For that condition the strength before bending would be reduced, in the curve, by about 20 percent.

Joints—Material of almost any width and length can be used with proper staggering of lateral and longitudinal joints. Scarfed joints made on an angle of 1 to 12 are figured at the full strength of the piece. If ends are butted, a lap each side of the joint of about 40 times the thickness is desired to transfer stress across the joint.

Glues—Because various glues are on the market, the mixing of the glue, time in which assembly of the beam should be completed, and the amount of pressure used, should be in accordance with the manufacturers' directions. Some glues require pressures up to 100 lb. or more per square inch. Others, the so-called self-bonding type, require only the contact provided by nailing; greater pressure would squeeze the joint too thin and be harmful. With some glues, the thinner the completed glue line, the stronger the joint will be.

Advantages of laminated-type—Laminated beams and arches can be fabricated with the desired size, shape and camber, using materials selected with respect to moisture content and uniformity in grade and quality which will minimize shrinkage and checking. A haunch can be formed at the end of the beam or arch to provide greater shearing strength if that is wanted, and the top can be built up as desired to give pitch for the roof.

Paper Waste Causes Slime Growths

Sphaerotilus or similar bacteria have given much trouble in streams, especially in regions where the paper pulp industries are important, in waterways where industrial wastes of various types are discharged, and in activated sludge plants. These bacteria or fungi grow in huge slimy masses and attach themselves to any submerged object. Reproduction is abundant and their growth is at a very rapid rate.

J. B. Lackey, in a report on the biological aspects of paper mill pollution in the Columbia River watershed, gives results and discusses a slime growth that caused gross clogging of nets of commercial fishermen. The organisms grow with little dissolved oxygen (although maximum development is in the presence of an ample supply), they like sugars, especially those from sulphite cellulose wastes, and they exhibit a high oxygen demand that tends to create a septic mud, probably producing hydrogen sulphide on decomposition. Lackey found the entire submerged surface of floating logs, stones, ropes, etc. in the river below a sulphite paper mill covered with a tough floor, consisting primarily of the sewage fungus in which were imbedded diatoms, protozoa, rotifers, insect larvae, worms and debris. Nets, traps, frames or anything submerged became covered or clogged almost overnight with this mass. On the side of the river where no waste was discharged there were no indications of sphaerotilus.

Since dilution in the river is great, taste, odor and similar nuisances are minimized. The wastes are not toxic to fish in these high dilutions, but "these growths materially affect salmon fishing in the area where they are present." The wastes are a factor in changing the river ecology.

Wartime Waterworks Problems

Protection from bombs, sabotage safeguards, mutual aid plans and an airing of management troubles constituted a major part of the conference on wartime waterworks problems sponsored by the American Water Works Association in Chicago June 21 to 25. The following are extracts from some of the papers. They give a cross-sectional view of the principal matters with which waterworks men are concerned today. A news account of the conference, in which are highlighted the views of the War Production Board in regard to water service, was published in the July 2 issue of ENR, page 3.

SAFEGUARDS AND REPAIRS

Bombing and Utilities

Probably no group of utility operators are going to have greater headaches that waterworks men when bombs fall. Some utilities destroyed in an air attack may remain without repair for a few hours, but water must be kept flowing in order to fight fires. English experience reveals that distribution facilities are the most vulnerable part of the system, and it has been found that interconnection of mains is one of the most valuable preparations that can be made. However, this does not mean that American water systems should all engage in making expensive interconnections. Where this should be done depends in large measure on the location of the municipalities in relation to probable air attack — and these areas are determined only by military authorities.

In regard to safeguarding pumping stations the English authorities have placed great reliance upon the use of blast walls and protective covering of vital machinery. Many machines are protected by concrete enclosures, so constructed that they can be lifted off in sections.

One of the principal causes of damage has resulted from the destruction of roof skylights. These can be broken as far distant as 600 ft. from the point of explosion. It has been found that an excellent safeguard is to suspend wire netting under the skylight and cover this with felt. This form of protection is a safeguard against splinters, provides a cover during blackouts, and also serves as a temporary roof should the skylights be blown out.

The time bomb (an invention of the devil), is regarded as a particularly serious menace in England because of the great delay it occasions in making repairs. Such bombs have time fuses set to operate in from ½ hour to 96 hours. In order to conserve life it is the custom to rope off an area wherein one of these bombs has fallen for a period of at least 96 hours. No one is permitted in this area and consequently there is a serious loss of time in making essential repairs to waterworks facilities.

At present there is no information that can be made public regarding the effect of bombing on dams and gate houses. But, it can be said that it is extremely difficult to damage a heavy masonry structure. In this connection it should not be overlooked, however, that a bomb falling in water can transmit a tremendous force by means of hydraulic pressure, and in one instance it is recorded that a bomb falling in water near a granite wall blew a 50-ft. hole in this wall.— *Walter D. Binger, chairman, National Technological Civil Protection Committee, New York, N. Y.*

Making Emergency Repairs

Wartime requirements that water supply be maintained uninterrupted to industrial plants coupled with the hazard of emergency repairs in amounts heretofore unthinkable, makes it necessary to review past and current practices. Waterworks officials must think not only in terms of what happened and what was done in the past, but what might happen and what new methods and equipment are available for use.

Emergency repair of a distribution system can be segregated in four steps. The first phase is the notification that an emergency exists—a message must be gotten to a responsible water department employee.

The second phase requires the dispatching of men to the scene. For most cities a night emergency crew is out of the question, and therefore it is necessary to assemble men by telephone. Night gangs should be staffed with men living near each other, so they can be quickly picked up.

After men have been dispatched, the third phase begins—determination of what should be done. For this purpose records are needed; they should be complete, simple, and easily duplicated. For small systems, several methods of preparing distribution records are acceptable. For large systems, the plat and list method, as used in Los Angeles and as outlined in the AWWA *Recommended Practice on Distribution System Records*, is satisfactory.

The fourth phase of emergency repair is execution of the work. For night work acetylene generators or portable electric generators should be available on the trucks; the latter probably are the most satisfactory. If the excavation must be made through concrete, either a compressor with suitable tools or a gasoline-powered paving breaker should be available.

Self-priming, gasoline-engine, centrifugal pumps are "musts" on speedy repair work. Rather than purchase trailer-mounted pumps, it will be advisable to put the same amount of money into smaller, more readily portable units, using two or more on a large repair job.

Use of mechanical joint solid and split sleeves, or a combination of them, will speed repair operations. With mechanical joint repair fittings, the valve closures do not have to be as good as when poured joints are used. Neither does the excavation have to be completely dewatered, since the bolt-fastened joints can be made under water, if necessary. Also, pipe ends do not have to be carefully cut off. Fittings are available that will cover jagged pipe ends with ease.

Wood plugs often are an excellent aid in making temporary repairs. In some cities, properly tapered wood plugs are used to close the ends of 4, 6 and 8-in. mains. The plugs, of course, must be blocked or otherwise secured to keep them in position when pressure is built up in the main.—*W. V. Weir, superintendent, St. Louis County Water Co., University City, Mo.*

Waterworks Protective Measures

Water supply protective measures in Connecticut are designed to cope with sabotage and "fifth column" activities. Of greatest concern is possible damage to structures, although danger from use of poisons cannot be dismissed. Sabotage by the enemy is the most apparent danger, but damage by "cranks" in these troubled times is also a possibility. Time and money for protection are best spent on water supplies serving industries, military establishments and housing projects. Somewhat less concentration should be placed on entirely domestic supplies where, despite the occurrence of inconvenience, a water supply interruption would be no decided setback to the war effort.

Protective measures for plant structures are a good investment—war or no war. Protection of buildings includes window guards, steel doors in lieu of wooden doors, and fencing. Many utilities have installed an especially heavy wire netting over windows of gate houses, filtration plants, pumping stations and chlorinator houses. Heavy wooden doors that were not replaced have been equipped with pin tumbler locks instead of a plain padlock. Fences have a special value even if they can be surmounted because a guard knows that a person seen on the wrong side deserves immediate investigation.

Some utilities have cleared away brush and cut off lower growths of evergreen trees so that land in the vicinity of dams, reservoirs and treatment plants can be kept under ready surveillance. Floodlighting of dams, of property near highways which is readily accessible, of filtration or chlorinating plants and of pump houses has been widely used. Sometimes this floodlighting is continuous; in other cases it has been used intermittently after installation. Posting of signs has been extended to keep away unwanted visitors and photographers. Signs that call attention to water supply properties have in some cases been changed to read only "No Trespassing."

Many regular waterworks employees have been deputized by the state police department as special policemen with power of arrest. The need for careful selection of police personnel is obvious, and the Connecticut state police investigates candidates for water companies and municipal water departments.—*W. J. Scott, director, Bureau of Sanitary Engineering, Connecticut State Department of Health.*

Pumping Plant Protection

Pumping stations of a water supply are the most exposed portion of the entire system, and they are the places where the greatest damage can be done. In Chicago, the Bureau of Engineering has given considerable attention to the subject of protecting station personnel. All the stations have been analyzed with respect to the protection they will offer to the operating force from bombs striking in the near vicinity, and safety areas within each station have been located.

Selection of the location of the safety areas was subjected to certain fundamental restrictions and requirements which, in turn, were based on knowledge gained by the British from their experiences. The items of merit for the selected safety areas were:

1—No part of the areas is in line with any window or glass partition.

2—All areas are located below the ground line and are enclosed with substantial wall sufficient to resist heavy blast pressure, bomb splinters and flying glass. Two or more emergency exits are provided, along with adequate facilities for ventilation.

3—Roofs are of sufficient strength to support a heavy load of debris.

4—Pipe vaults and other areas in a station that are likely to flood rapidly from broken mains, either within or outside the station, were not considered.

5—Basement areas with high pressure steam lines and high voltage electrical equipment also were avoided, as well as the areas in the vicinity of chlorine storage.

Provision is now being made to protect operators who must remain on duty in exposed locations by providing small portable shelters located close to their stations, where they may quickly retire for short periods and still keep an eye on station performance.—*W. W. DeBerard, city engineer, Chicago, Ill.*

MUTUAL AID SYSTEMS

New York Experience

The mutual aid plan in New York State, ordered into operation on Oct. 14, 1941, by Gov. Herbert H. Lehman, is carried on as part of the civilian defense program in close cooperation with waterworks officials and coordinated with the work of local defense (now war) councils.

The plan was formulated by a committee of waterworks experts appointed, at the request of the governor, by the New York State Conference of Mayors and the New York State Department of Health. It provides for dividing the state into 23 zones with a waterworks official in each appointed as zone coordinator, aided by the district engineers of the state health department and the county sanitary engineers of Westchester, Nassau and Suffolk counties as assistant zone coordinators. With the exception of New York City, Westchester, Nassau and Suffolk counties, which constitute separate zones, the zones correspond to the existing state health department districts.

At the regular session of the 1942 New York State legislature two bills were passed that relate to the mutual aid plan and provide needed authority for carrying out its objectives. The objectives may be outlined as follows:

1. To promote to the fullest possible extent the interconnection of municipal water supplies with adjoining systems and with the approved supplies of industries or other approved systems, so that in event of failure of one supply, continuation of service may be assured by the other.

2. To bring maps of distribution systems completely up-to-date and to have accurate records maintained locally as to location of valves, hydrants and other vital parts of the distributing systems.

3. To cooperate with local fire authorities in regard to survey of all

possible emergency sources of supply in each community and preparations for their possible use, supply full information to fire authorities in regard to valve and hydrant characteristics, and make a detailed study of distribution systems with the view of ascertaining and correcting deficiencies.

4. To cooperate with power companies and other utilities in regard to deficiencies in power supply and determination and application of the measures necessary to continue water service in event of power failure.

5. To cooperate with local war councils and local civil defense directors in integrating plans for the protection and repair of waterworks with the defense plans of the local community, and to train volunteer workers assigned by local offices of civilian mobilization in the techniques of waterworks operation and repairs, so that in the event of an emergency such volunteer workers will be supervised by regular water department personnel.

6. To make studies in regard to the needs and to take all necessary steps to protect supplies against possible sabotage.

7. To prepare a detailed inventory of waterworks personnel, equipment and supplies, and file with the zone coordinator so that in event of an emergency needed assistance to any community in distress can be arranged for promptly.

Special studies of water service and fire protection to industries have been made by 49 cities, and in 45 places organization and training of auxiliary personnel has been undertaken. Inventories of waterworks equipment, materials, supplies and personnel have been submitted by 684 communities.—*Earl Devendorf, assistant director, Division of Sanitation, New York State Health Department, Schenectady, N. Y.*

Pennsylvania's Plan

Primary objective of the mutual aid plan in Pennsylvania is to combine the resources of the waterworks of that state to the end that the chances of serious failure of public supplies will be minimized. From a war standpoint it is felt that the first duty is to keep water flowing to industries. It is believed that the organization should act to guard against failure of essential supplies from any cause and to lessen the damage if there is a failure. For that reason we are urging unusual care in operation, precautions against trespass, an adequate check on the loyalty of employees, and careful thought to installations of cheap fire cisterns.

The mutual aid plan in Pennsylvania, which was created Dec. 10, 1941 (unsupported, however, by any specific state laws), functions through the 15 districts into which the state has been divided. A chairman is in charge of each district and under this man there are county chairmen, appointed by the district chairman, and in a few instances a deputy or subdistrict chairman, also appointed by the district leader. A central office is located in Harrisburg.

Each district chairman is allowed to work out his own ideas, but he is urged to do some specific things. These include: (1) Acquaint each water supply agency in the district with the duties of such agencies as agreed upon by the district chairman; (2) Urge managers to prepare each system to take care of itself with adequate material and trained personnel; (3) Get pledges of cooperation and obtain confidential inventories of men and materials available at each plant; (4) Make up a district inventory from the confidential, individual inventories and forward this district inventory to the central office at Harrisburg; (5) Make a friendly but critical check on the water utilities and, (6) Stand ready to round up men and materials when needed.

If a call for help comes it is to be directed to the district chairman, who is to rely on the resources of his own district first but is to call on his neighboring districts or on the Harrisburg office in case of needs that cannot be met from the resources of his own district.—*John H. Murdoch Jr., general chairman, Pennsylvania Public Water Supply Defense Organization, Harrisburg, Pa.*

Maine Arrangements

In January, 1942, the governor of Maine called a special session of the state legislature, which passed an act creating the Maine Civilian Defense Corps. Under this act a director of civilian defense and a civilian defense council was appointed. The state water coordinator, who had been appointed in December, 1941, by members of the Maine Water Utilities Association, was made a member of this council. In this way the authority of the Maine water coordinator derives from the public laws of that state.

Zone coordinators and the assistant coordinators for the ten districts into which the state has been divided are all water superintendents and members of the Maine Water Utilities Association. Through their appointment as zone coordinators they also become members of the civilian defense corps, and are under the directions of the state coordinator.

In case of emergency it is planned that any utility in need of help, either of material or man-power, will first call either the zone coordinator or the assistant, whichever is nearer. By reference to his inventory the coordinator can determine where the needed help can be obtained, and if necessary take steps to insure prompt cooperation. If aid is not available in the zone, the coordinator will call the state coordinator who will inform him as to the nearest possible point at which it can be obtained.

Boy Scouts have been extensively trained for messenger service. For control center work they can be used to good purpose in lieu of telephone service.—*H. H. Potter, water works engineer, Maine Public Utilities Commission, Augusta, Me.*

MATERIALS AND MANAGEMENT

Saving Critical Materials

How substitutions may aid in conserving critical materials is illustrated by Chicago's experience in connection with construction of the South District filtration project. In the temporary omission of items from the schedules, architectural features suffered more heavily than structural, mechanical or electrical features.

Original plans called for fenestration of aluminum sash and glass block. Recognizing that aluminum would be unprocurable, plans were changed to substitute steel sash—then came Pearl Harbor. This led to a decision to eliminate all sash and to board up the openings "for the duration." Since a certain quantity of steel frames were required for the glass block, these, too, were eliminated and

the openings also will be boarded up. Enough wood sash can be inserted in the closed openings to provide some light for the interiors.

Doors throughout the plant, which were to be of metal, have been omitted and only outside doors and those on the interior that are absolutely essential will be installed. Temporary doors will be of wood, barn-door construction. All steel stairs have been eliminated, wood being used where stairs are essential. Elevators required to handle chemicals will be retained.

Plaster work or metal lath installation will be postponed and this, in turn, will effect some savings in electrical conduit requirements. Offices and some toilets will not be finished and this will save materials required for heating, plumbing, wiring, windows, doors and hardware. Three 200-hp. boilers were planned to service the plant but one of these, a spare unit, will be omitted. Installation of one of the two high pressure steam lines likewise will be deferred.

The framework and bins of the chemical building were changed from steel to concrete, as a result of which the structural steel needs were decreased from 1,500 tons to 100 tons. The additional reinforcing required was 290 tons, thus leaving a net saving in steel of 1,110 tons.

Study also showed that certain equipment, not essential for plant operation, could be eliminated until after the war. One such item was a 30-in. header designed to distribute waste washwater uniformly across the intake basin; suction lines to permit ready dewatering of each half of the filtered water reservoir also will be omitted. And the washwater drain between the plant and the lake will be constructed of reinforced-concrete pipe rather than of 48-in. cast-iron pipe.

Reductions effected in major critical materials between September, 1941 and May 15, 1942 are shown in the following table:

Material	Sept., 1941	May, 1942	Reduction (%)
	Tons	Tons	
Struct. steel.	5,148	3,068	40
Reinf. steel..	895	1,274	42*
Cast iron...	*5,744	3,186	44
Copper	268	128	52
Bronze	91	74	19
Lead	237	75	68
Zinc	29	19	34
Rubber	30	10	67
Total	12,442	7,34	37

* Increase

Because of the distance involved in the chlorination work and the quantities which must be handled, duplicate 4-in. and 5-in. lines are required. The amount of rubber involved is somewhat large. Two substitute materials appear worthy of consideration. One is glass-lined steel pipe and the other is porcelain pipe.—*F. G. Gordon, senior filtration engineer, Bureau of Engineering, Department of Public Works, Chicago, Ill.*

Metallized Maintenance

In the waterworks field safeguarding of metal surfaces is an especially serious problem because of the ever-present combination of moisture and oxygen. An effective aid in protecting and rebuilding worn or corroded metals is "metallizing," a method of spraying molten metal on metal or any other properly prepared surface.

The most commonly used metals for spraying are lead, tin, zinc, babbitt, aluminum, bronzes, brasses, copper, nickel, monel, iron and steels. No heat is applied directly to the base material at any stage of the process. Consequently, there is no warpage, no distortion, no heat strains or stresses, no interferences with the characteristics of the base material whatsoever.

The value of metallizing as a maintenance aid in the waterworks field has been demonstrated at Erie, Pa. The first job was the repair of a 110,000-gal. steel tank which showed signs of heavy corrosion and pitting on the interior. The work was done by contract which called for the blast cleaning and metallizing with zinc of the interior surfaces only. The tank is open at the top, 32 ft. in diameter by 19 ft. deep. The method used by the contractor was to sand-blast an area just large enough to permit two applications of zinc each day, thus assuring a completed surface every day which would not be affected by the dust created by subsequent blasting on an adjoining area. The final zinc coating required was .006 in. Work was completed in about three weeks time.

A careful inspection after eight years of uninterrupted service shows no sign whatsoever of the coating having failed. In making comparisons between metallizing and painting, cost must be a primary consideration. The metallized job cost from two to two and one-half times as much as a good paint job. Nevertheless, it is apparent that sizable savings can be made over a period of time. Eight years of service in this particular case has not been sufficient time to even estimate what the full protection period will be.

Another Erie job where metallizing proved valuable was in the treatment of 128 filter troughs. The surface area of the troughs is 12,432 sq. ft., and the total cost of the metallizing was $7,962. Of this amount $4,526 was charged against labor and included the cost of removing and replacing the sand in each unit as well as the rough scraping of each trough before grit blasting.—*C. E. Palmer, Palmer Filter Engineering Co., Erie, Pa.*

Kansas City Problems

At the present time it is almost impossible to employ and retain qualified personnel in many classifications at the salaries the Kansas City, Mo., water department is able to pay. Engineers and other professional and skilled employees are not available so that less competent personnel must be engaged and trained. When the trainees develop skill, they are likely to be lost also, with their predecessors, to war construction and production work, sometimes at salaries nearly double the scale of the city.

During the past fiscal year (May, 1941 to April, 1942) the average number of employees was about 450. In this period there were 319 separations, with about the same number of appointments, making the turnover about 70 percent. Annual turnover in the principal office divisions was about 85 percent, in engineering and operations about 55 percent, and in the guard personnel (in only four months) 87 percent.

In addition to a need for higher salaries to meet at least partially the competition of agencies having apparently unlimited funds, the Kansas City water department has the abnormal expense of providing guards for those parts of the waterworks system most vulnerable or difficult of replacement. Present expense for guards in Kansas City is about 8 percent of the operating cost of the department, and about 12 percent of the employees are in the guard service.—*K. K. King, director, Water Department, Kansas City, Mo.*

Milwaukee Problems

One of the major administrative problems in Milwaukee pertains to the extension of service to war industries, involving a legal issue and

decisions rendered by various governing bodies and the courts over a period of years. Decisions have been rendered to the effect that where the Milwaukee waterworks has voluntarily extended its service to a suburb or township beyond the corporate city limits, the water utility must take on and serve all applicants for water in that entire suburb or township. Realizing the effects to the owners of the utility—the citizens of Milwaukee—if an indiscriminate expansion to outsiders were permitted to continue, the common council adopted the policy of refusing to voluntarily extend service beyond the corporate limits.

Now, with the large expansion of industries by the government, Milwaukee officials find that these new industries are being located around the city's boundaries due to inability to find available sites within the city. If the officials refuse water service to a new plant just outside the city, they are failing to aid the war effort and are called unpatriotic. If the officials permit water service, they may jeopardize their legal status in future litigation, contrary to the best interests of the utility.

As a solution to this condition, city officials have requested the government agency owning the particular property to annex that property to the city. In one case the owners of such property have filed an annexation petition, and the city has cooperated by permitting a water connection, even though the annexation proceeding has not been finally consummated. In another case, the governmental agency owning the property has refused to become annexed and the War Department has ordered the city to serve water subject to later determination of the annexation issue. This action relieved the utility of voluntarily extending its service beyond the city limits, and still permitted the plant to secure water.—*H. H. Brown, superintendent of waterworks, Milwaukee, Wis.*

Detroit Problems

Construction of a large number of war plants has led to numerous estimates as to the additional workers that will be needed in the Detroit area when production gets into full swing in 1943. The smallest increase in population on the basis of these estimates is 200,000 within one year and generally it is thought that the population increase will be close to a half-million. Not only will the industrial expansion require large quantities of water, but the increase in population in itself is that of a city of considerable size. Most of the development is within the area served by the water department.

This prospective increased load comes on top of the biggest year's pumpage ever experienced by the Detroit waterworks. In 1941 the department delivered to the mains some 102 billion gallons of water, which was a 7 percent increase over the previous high established in 1936 and some 8.5 percent over the 1940 total. An analysis of the pumpage records shows this increase was largely due to increased industrial use. While there was an increased domestic use due to some 100,000 increase in connected population, the domestic use per capita declined somewhat. This was probably due to low pressures in the outlying districts where the bulk of the new residential developments occurred.

As expected, rapid industrial and residential expansion have not proceeded without difficulties to the Detroit water department. Within the city limits $750,000 has been spent to provide mains to new or enlarged industries. These commitments were made and largely expended before there was any governmental agency set up to assist in financing such extensions. One of these lines involved an installation to provide a 17-mgd. peak load capacity in an area most difficult to service. Practically all of this construction had to be rushed to keep pace with a very rapid rate of construction. Most of the extensions involved close checking of possible demands because the industries to be served did not have adequate experience with new processes on which to gage their demands. For instance, in one large plant the architect thought 50,000 gal. per day would be sufficient, but the water officials thought plans should provide for at least 2 mgd. Actually over 2 mgd. is being used and this plant is having its capacity tripled.

Surveys show that to the water department has fallen the task of providing for a prospective increase in the metropolitan area of some 500,000 within the next twelve months, as well as being the primary source of supply of most industrial plants in the metropolitan area. The department also has the task of providing for a past increase in population and a shifting of population within the city limits.—*L. G. Lenhardt, general manager, Department of Water Supply, Detroit, Mich.*

Indianapolis Problems

Present problems of the Indianapolis Water Co. are listed as the three P's—personnel, priorities and pipelines. Principal cause of personnel turnover has been the competition of war industries. Thus far the company has lost only 20 men to the military services, but many more than that have left apparently for better paying jobs.

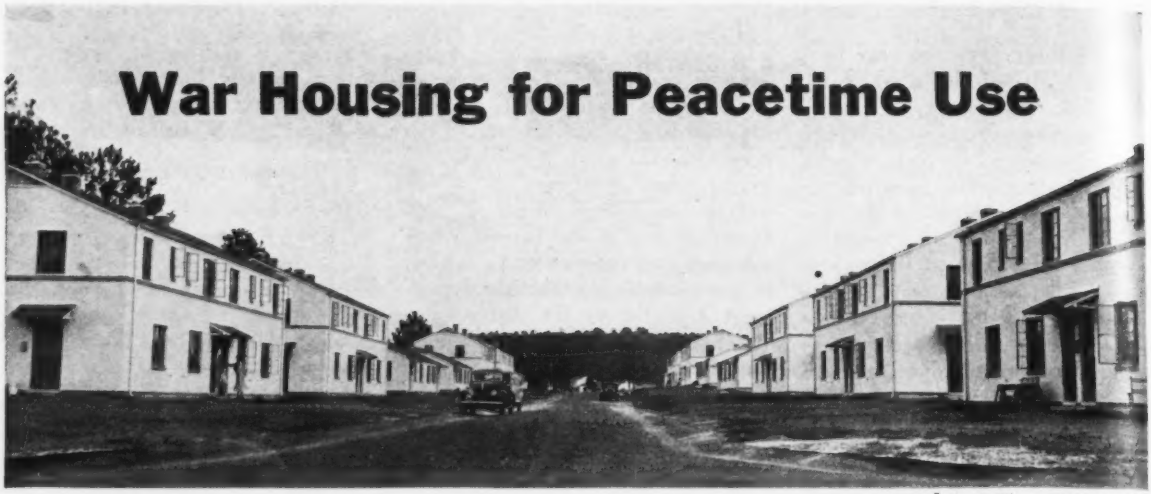
Women workers are substituted for men where practicable. There is a reduction of customer services and there is a consideration of quarterly meter readings rather than monthly, for domestic consumers. However, monthly billings would continue using estimates of consumption on the first and second months.

As to priorities, the Indianapolis Water Co. has little complaint to offer, realizing that the War Production Board is having a tremendous job to do. When England went into the war the company began to put its plant in order and the system is now in good shape for the next five years. Difficulty is expected in obtaining replacements and it is assumed there must be a let-down in quality or that substitutions must be made for some necessary waterworks material. The chief job is to learn how to make adjustments to changing conditions without wasting energy and time in fretting over the things that cannot be helped.

Pipelines or water main extensions present a constantly changing problem. New defense agencies generally have been located on the outskirts of the city with little or no regard to the availability of utility services. Thus, the company has been forced to spend over $300,000 for special water main extensions to meet these conditions.

In January the company made a check of the city's records and found over 15,000 vacant lots adjacent to water mains and other utility services, including water service lines to the property line. A card file was made of each of these lots and turned over to the local real estate board.—*H. S. Morse, vice-president and manager, Indianapolis Water Co., Indianapolis, Ind.*

War Housing for Peacetime Use



Federal Works Agency photo

Fig. 1. Good community planning and attractive, durable houses enhance the value of this project for post-war needs.

W. J. Henry
Senior Construction Engineer, Public Buildings Administration
Federal Works Agency
Columbus, Ga.

***Contents in Brief**—Housing of a permanent type of construction that will be suitable for public housing needs in the post-war period has been constructed at Fort Benning, Ga., at the unusually low cost of $2,172 per family unit. The contract for this project of 350 dwelling units was carried out on a cost-plus-fixed-fee basis, which is said to have facilitated close cooperation between contracting and supervising organizations.*

WARTIME HOUSING FACILITIES of a permanent type that will be readily convertible to public housing needs after the emergency, have been completed at Fort Benning, Ga., at a cost of only $2,172 per family unit. This extraordinarily low cost for masonry units—$828 under the $3,000 limit set by Congress under the initial defense acts—was achieved on the basis of a cost-plus-fixed-fee contract negotiated by the Public Buildings Administration.

In meeting the demand for housing facilities, these dwellings have been designed and built to provide ideal conditions, as nearly as may be, for health and community requirements. The same standards of sanitation, ventilation, light, heating, plumbing, minimum room sizes and maximum dwelling units permitted per acre have been maintained as in public housing, and in this instance may be considered a direct continuation of the public housing program.

The project consists of 110 multiple dwellings, comprising 10 buildings of six units each, 45 buildings of four units, and 55 buildings of two units each. There are 55 one-story buildings and 55 two-story structures. Community facilities include a management and maintenance building and a truck shed.

The houses are grouped on a 50-acre site, which was improved by the addition of bituminous macadam pavements, concrete sidewalls, underground street lighting system, overhead electrical distribution, sewers and water supply facilities. An important civil defense measure has been the installation of an automatic fire alarm system, including complete central station equipment, outdoor pneumatic horn and alarm call boxes at convenient points.

Construction features

Principal features of construction include:

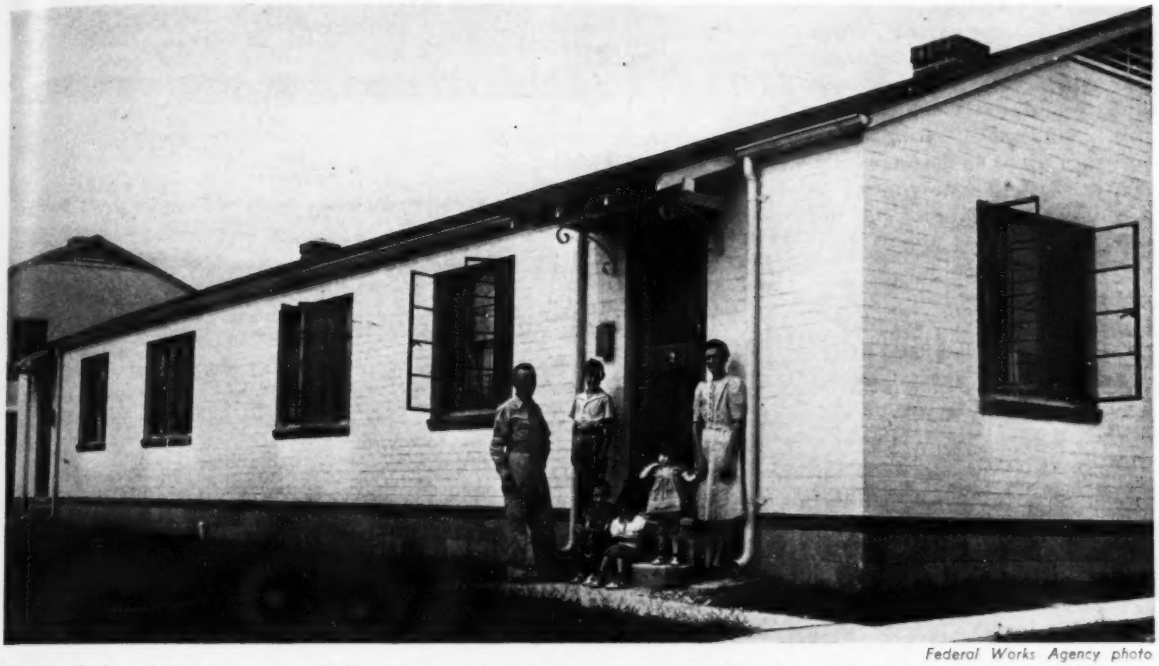
Foundations—Reinforced concrete
Foundation walls—Concrete block
First floor—Reinforced concrete
Second floor—Wood joists
Roof—Wood rafters and asphalt composition shingles
Exterior walls—Over-sized brick masonry
Interior partitions—Wood stud and plaster
Windows—Steel sash

First Floor—Concrete slabs 4-in. thick were poured directly on grade, with beams resting on firm original ground, and supported by columns where beams did not rest on original earth (Fig. 4). The slabs are waterproofed, hardened, and colored with an approved non-metallic aggregate, with asphalt tile floor covering in all first floor bathrooms.

Second Floor—Select grade gum, tongued and grooved and machine finished was used. This was laid on building paper over sub-flooring laid diagonally with floor joists. Linoleum floor covering was used in all second floor bathrooms.

Roof—Roofing construction consisted of rafters and sheathing with a covering of asphalt composition shingles. An attractive effect resulted from the use of two colors of shingles, red on the two-story and dark gray on the one-story buildings.

Exterior Walls—Above the first floor the walls were built with oversized brick masonry. Rowlock courses and cement wash were used at first-floor elevations and at window sills.



Federal Works Agency photo

Fig. 2. Walls of the houses are built with over-sized brick masonry. Exterior exposed brickwork is painted white.

Interior dividing walls are hollow tile extending up from the foundation walls through the attics to follow line of roof sheathing to act as a fire stop. All exterior exposed brickwork is painted white; interior faces are plastered over a coat of damp-proofing. The metal windows are of lightweight casement type, and 16-mesh copper metal screens of the horizontal sliding wicket type were provided for all windows with one screen for each vent, or for pair of adjacent vents. All windows are provided with shades, with suitably designed combination type brackets for the shades, curtain rods and drapery rods. All outside doors are glazed and are provided with shades; also outside screen doors. Metal clothesline posts are installed in rear.

The cost-plus-fixed-fee form of contract made possible a working arrangement that brought the contractor's organization, the architects, and the federal field supervising authorities together in close cooperation. As a result the work was expedited without sacrificing good workmanship, and changes in construction features were facilitated to keep the costs low without compromising on materials. Careful cost records and progress charts and schedules were kept by the Public Buildings Administration and the contractor's organization.

Instead of having to wait for completed plans, receiving bids, etc., as would have been necessary with form of contract award to lowest bidder, grading and excavation work was started as soon as the contractor received notice to proceed.

Lumber and other materials were purchased in total quantities at the

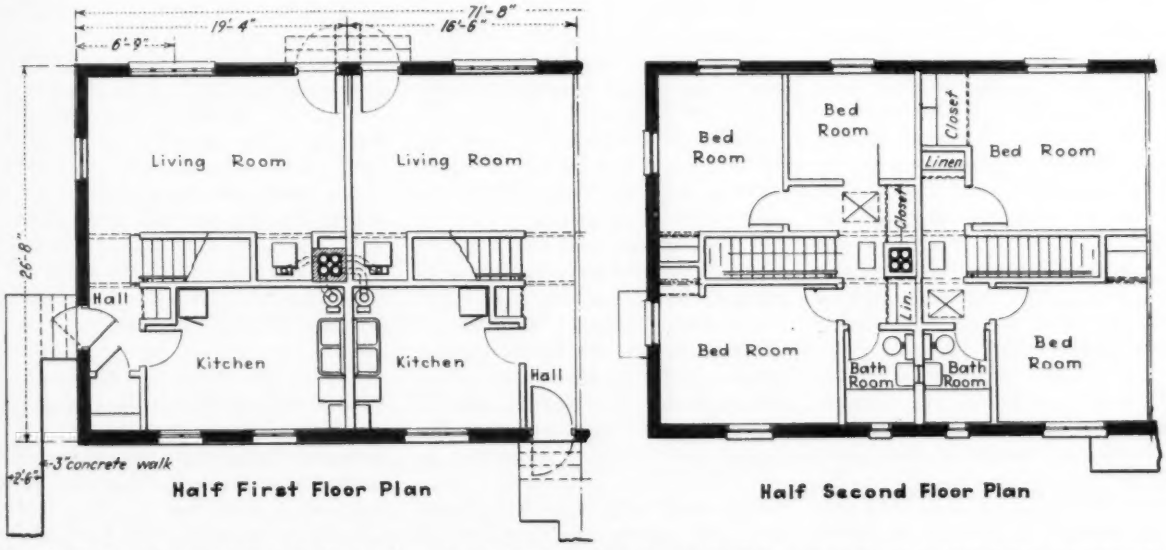


Fig. 3. First and second floor half-plan layouts of the two-story house. Each two-story house contains four apartments.

outset and delivered to the job as needed. Prices were agreed on with the various suppliers at the beginning of operations and were held with delivery limited to 90 days, and as a result considerable savings were made, particularly on the large items.

Further savings were realized by permitting the contractor to subcontract the following work:

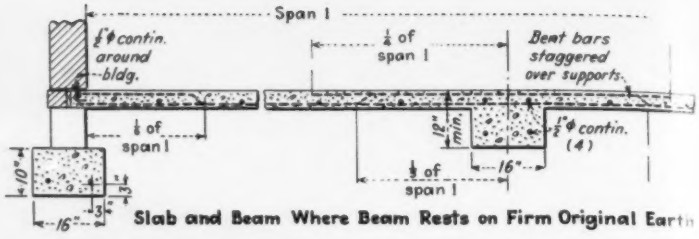
Excavation and grading
Water distribution lines
Sanitary and storm sewer lines
Electrical wiring and fixtures
Street lighting system
Lathing and plastering
Plumbing

Installation of the fire alarm system, the floor covering in the bathrooms, and the planting were done under separate contracts.

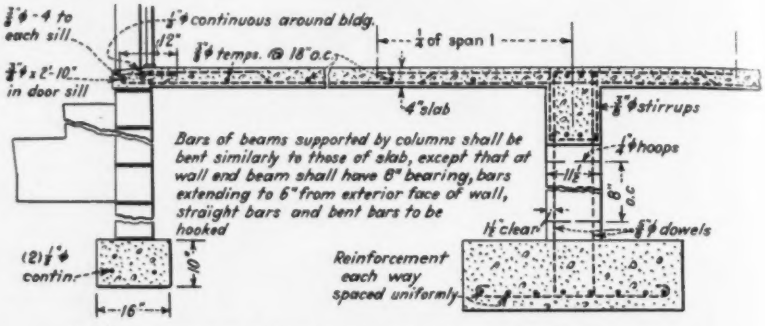
In connection with street paving, materials were furnished and equipment rented locally, and the work was performed by the forces of the general contractor. A satisfactory sub-base material was found available near the site.

All fixed equipment furnished by the federal government included: electric ranges, refrigerators and hot water heaters; plumbing fixtures; medicine, kitchen and bathroom cabinets; and electric light bulbs.

Space unit oil heaters were furnished by the contractor.



Slab and Beam Where Beam Rests on Firm Original Earth


-4 to each sill
continuous around bldg.
12"
temps. @ 18" o.c.
¼ of span 1
in door sill
4" slab
stirrups
Bars of beams supported by columns shall be bent similarly to those of slab, except that at wall end beam shall have 8" bearing, bars extending to 6" from exterior face of wall, straight bars and bent bars to be hooked
hoops
1½" clear
8" o.c.
dowels
(2) contin.
10"
16"
Reinforcement each way spaced uniformly

Slab, Beam and Footings Where Columns are Required

Fig. 4. Concrete design details of the footings, slabs and beam for the first floor.

All the above equipment was assembled and installed in the housing units by the contractor. The plumbing fixtures are standard equipment—white baked enamel bathtubs, cabinets, and cabinet-type sink and tray combinations with combination supply faucets.

The project was carried out under the general direction of Neal A. Melick, supervising engineer, and Murray M. Davis, assistant supervising engineer, in charge of defense housing, for the Public Buildings Administration. Field operations were carried out under the supervision of Emil C. Seiz, project engineer, and the writer. Murphey Pound, Columbus, Ga., was the general contractor, with J. P. Bradfield as general superintendent. Plans were prepared by Lorin D. Raines, T. Firth Lockwood, E. Oren Smith, James W. Biggers, housing architects, of Columbus.

Planning Agencies Fill Vital Role

PLANNING AGENCIES exist in nearly three-fourths of the cities over 25,000 population to help solve war-connected problems as well as to guide regular physical growth of the community, according to a survey by the International City Managers' Association. The planning agencies, in some cities established for many years, are of special use in working out solutions for housing, sanitation and transportation difficulties which arise in cities undergoing sudden expansion because of war industries or army camps in the vicinity.

The Atlanta and Fulton County planning commissions, for example, were called in for advice on selection of a site for a new airplane plant. Recently the Detroit City Plan Commission, with other municipal planning agencies in the area, were consulted on problems in connection with the new "war-made" community of Willow Run.

The percentage of cities with planning agencies varies directly with the size of the city, according to the survey. Each of the 14 cities of over 500,000 population has a planning agency, while only 64 percent of the cities between 25,000 and 50,000 have established such agencies.

Local planning agencies have from three to 55 members, but about 88 percent have 10 members or fewer. Many cities have one or more ex-officio members, usually the city engineer or the mayor. In about two-thirds of the cities appointments to the planning board are made by the mayor, and in about 20 percent by the council.

One of the commonest functions of planning agencies is the review of proposals for new plats or subdivisions, the survey showed. In a number of cities planning agencies are required to pass upon capital improvements before the council takes final action, and upon proposals to dispose of city-owned land.

More than half the cities said they had master plans in some stage of development, though in 43 percent of them the plans are still in a preliminary stage, and in only one-third of the cities have the plans been approved by the council. More than half the cities also reported long-range public works programs underway, most of them with aid of the federal Public Work Reserve program.

Though the urban part of the nation is well supplied with planning agencies, a large share of the agencies have little or no funds and lack adequate technical staffs, according to the survey. Less than one-fourth of all cities reporting said they had full-time planning staff members.

Emergency Treatment of Army Camp Sewage

Frank Backmann
The Dorr Company, Inc.
New York, N. Y.

SPEEDY CONSTRUCTION of military camps often finds roads and buildings finished and such utilities as the water distribution system and sewage pipes installed long before the sewage treatment plant, whose design and equipment-procurement are necessarily time-consuming, can be completed. Inasmuch as military authorities are anxious to move men into these establishments as soon as possible, some type of emergency sewage treatment that could serve until the permanent facilities are ready would obviously be an advantage. The purpose of this article is to suggest a type of emergency treatment using lime to precipitate the solids and also sterilize the sewage.

Because sewage treatment has not been standardized as have barracks, sewers and water mains, it consequently requires a longer time to install sewage treatment facilities than other units making up the camps. First, careful study has to be made on each project to determine the degree of treatment required to maintain sanitary conditions of the stream into which the sewage effluent is discharged.

The next step is to decide on the type of treatment to give the desired results and to determine the size of the various units to make up the plant. As equipment deliveries are controlled by priority ratings, the sooner equipment orders are placed the better the chance of having them filled in time. Engineer-architects who design sewage treatment plants differ in their procedure in handling this work. Some prefer to prepare complete structural drawings and have the equipment purchased by the contractor, but this procedure delays the delivery of the equipment by the amount of time it takes to make the design. Other engineers, and by far the majority, prefer to prepare equipment specifications, and purchase the equipment before designs are started. This procedure has the advantage of saving several weeks on the delivery of the equipment and eliminates revision of drawings should the equipment purchased be somewhat different than the designs called for in the completed plans. Still a third procedure, which has been found to save time over the two mentioned above, is to utilize "allocation contracts" for equipment, as permitted by the War Department.

Lime easy to apply

Experience has shown that contractors have been able to build the concrete structures of the sewage treatment plant such as sedimentation tanks, trickling filters, etc., long before the equipment to be installed in them arrives on the job. It is, therefore, suggested that, where the settling tanks are completed, lime be used to clarify and disinfect the sewage temporarily. This can be done at very small expense, as little additional equipment would be required. A chemical feeder to feed the lime is the main item needed. High-calcium hydrated lime purchased in bags is preferred to quicklime. Mixing of the lime with the sewage can be arranged by installing temporary baffles in the channel leading to the primary settling tank; or where a Parshall flume precedes the settling tank, the milk of lime could be added ahead of this flume, as thorough mixing will be accomplished between the lime solution and sewage passing through this unit.

Lime was used to treat sewage in England over fifty years ago and was actively promoted in this country from about 1915 to 1926, either alone or in connection with an electrolytic process. In 1924 and 1926 lime treatment plants were installed at New Holstein and Gillett, Wisc., where the domestic sewage contained cheese factory and cannery wastes. These plants are still giving satisfactory results. Many other plants using lime as a precipitant were installed and are still operating.

The action of the lime is to precipitate calcium and magnesium bicarbonates from the sewage, giving a voluminous precipitate, which when settling carries with it the suspended solids. In actual practice, sewage with proper lime additions and mixing gives a water-white clear effluent. It is advisable to add lime to a point of causticity, as bacteria are also destroyed at this point; causticity of 10 to 20 ppm. appears to be preferable. The reactions with lime are similar to water softening reactions and, as a matter of fact, this process results in softening the sewage liquor. The amount of lime will vary from 600 to 1,500 lb. per mg. of sewage, depending on its character. Waters which are soft may require small amounts of coagulant to assist in the clarification.

Disposal of sludge

The sludge resulting from this treatment can be disposed of on sand beds without nuisance. The sewage solids are diluted with the mineral precipitates and, as the sludge is caustic, flies will light on it for only a second as the nature of the sludge acts as a repellent.

Until the sludge removal mechanisms can be installed, the sludge will accumulate in the sedimentation tanks. As most of these tanks have a slight slope, some of the sludge can be removed by simply opening the sludge draw-off line. The balance of the sludge can periodically be moved to the sludge draw-off by hand squeegees. The sludge in the tank will not readily become septic of the sewage treatment is always properly controlled to or a little above the caustic reaction.

With this lime treatment, scum due to grease is not a problem as the lime reacts with the grease, and the heavy precipitate formed carries it to the bottom of the tank as sludge.

As a temporary expedient, to allow troops to be moved into the camps where tanks are available but where equipment delivery is delayed, it is thought advisable to make the above suggestions. With the proper application of this method, suspended solids can be reduced approximately 90 percent; B.O.D. at least 70 percent; total bacteria approximately 90 percent; and B. Coli approximately 99 percent.

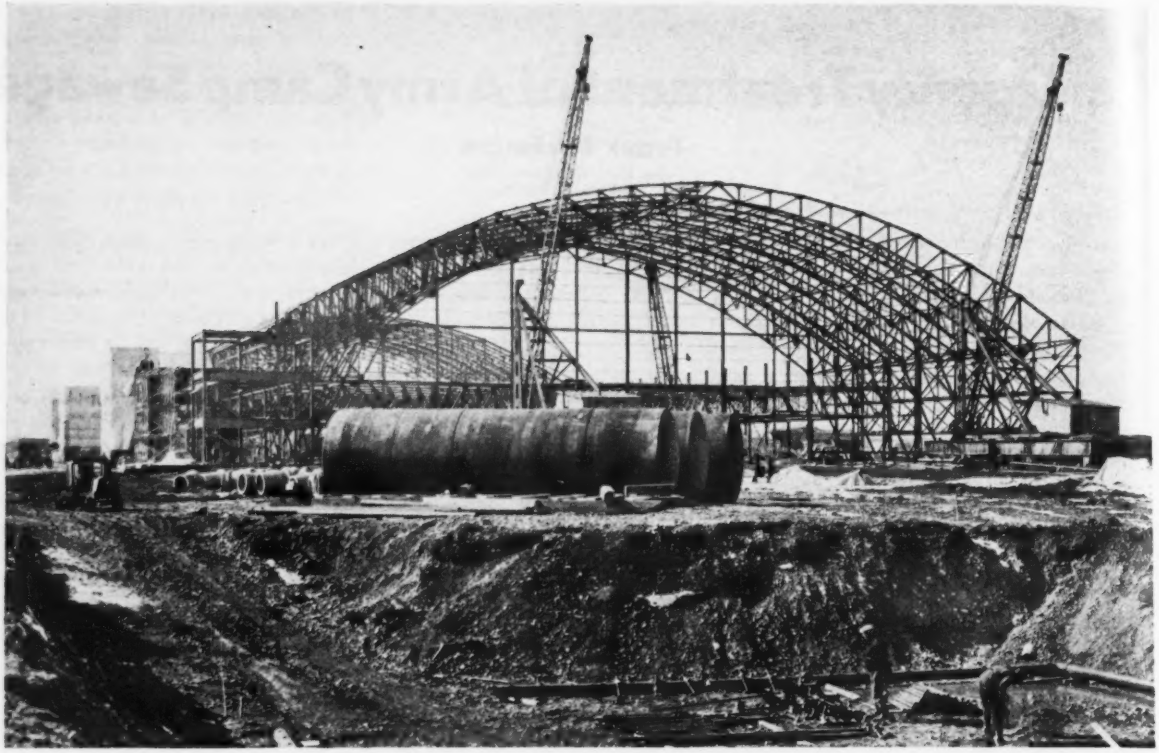


Fig. 1. Travelers approach end of run on first half of building. Second half was built on the right.

Bridge Travelers Erect Aircraft Building

***Contents in Brief**—Huge structure combining high 3-hinged arched framing and conventional truss-and-column factory framing is erected by two 30-ton bridge travelers with 130-ft. booms. Each half of the building was erected as the travelers moved from one end of the site to the other. Heaviest erection pieces were the half arch trusses, each of which weighed 16 tons.*

AMONG the most spectacular of war-generated structures are the huge 10-acre airplane repair buildings located at several of the nation's new Air Corps depots. And on one of these jobs an unusual note was added to the construction operations by the contractor's use of two large bridge travelers to erect the steel framing. Scarcely more than a month before they raised the first steel in the building, the travelers were busy erecting an elevated parkway in New York City. On this viaduct job their 30-ton capacity was frequently taxed, while on the building much lighter loads were the rule, yet in both cases the travelers functioned efficiently.

The airplane repair buildings are unique structures. Each end consists of two standard airplane hangars placed side by side, while the central section is a conventional monitor-roofed factory. Two distinct types of framing are therefore involved—three-hinged arch trusses of 275-ft. span and 90-ft. rise, and parallel chord trusses of 121-ft. span on columns that provide a ceiling height of 28 ft. in one-half the factory area, and 35 ft. in the other half. The choice of the travelers as the erection units was, of course, predicated on the high arch-roof requirements, but they also operated effectively on the low factory framing.

Built in two halves

The building was erected in two halves either side of the longitudinal center line, each half thus consisting of a hangar at either end with the factory between. Railroad spurs laid down the center line of each half permitted the steel to be brought directly to the erection locations, where it was unloaded by a crawler crane. On either side of this railroad, at about the quarter points of the hangar span, rails were laid for the travelers, which were thus in a position to reach all points of the structure as they backed through it from end to end.

The travelers are shown in the accompanying illustrations. They are entirely of steel, and the frame is of considerable size, 24 × 80 ft. in plan, in order to accommodate the necessary counterweights. The mast is a particularly sturdy box section built up of perforated cover plates, and the boom, including a 10-ft. extension, is 130 ft. long. The travelers were moved by their own power through snatch blocks and lines, or were pulled by a crawler crane when it was available. After completing one-half the building the travelers, after the booms were removed, were lifted onto a flat car by crawler cranes and hauled around to

their new position by a switch engine.

With such versatile equipment and such an efficient layout, the contractor had reason to expect a job of record-breaking speed, but a shortage of qualified steel workers and the resulting high turnover in the gangs that could be assembled caused disappointment in this respect. Nevertheless, the steel was erected in a creditable manner considering this problem and winter weather conditions when the work was done.

Erecting the arch trusses was the most unusual element of the job. For this work each traveler handled the steel on its side of the center line. First operation was to place the shoes and to install the ties that joined them. Each tie, laid in a trench beneath the floor, consisted of two $10 \times \frac{1}{2}$-in. plates to which turnbuckles were welded at the center to provide for necessary adjustment. With the shoes thus fixed, the travelers, sometimes assisted by a crawler crane, erected the members of the arch up as far as the haunch. In the meantime, the half-arch sections, extending between the haunches and the center pins, were assembled and riveted on the ground. The final operation was for each traveler to raise these half-arches, each weighing 16 tons, into position and hold them there until the center pin could be driven and the haunch connections made with bolts and drift pins. By this procedure all but 75 of the 1,100 rivets in each half-arch could be driven on the ground.

Progress on the arch portions of the building was about a rib a day, the usual schedule being to assemble an arch on the ground during an afternoon and to raise it the next morning. Even faster progress was made on the shop steel because the trusses were lighter and shorter, and because they came to the job partly assembled.

Fig. 2. One of the travelers as it was being assembled by a crawler crane. The boom is 130 ft. long, and the frame, mast and stiff leg are of all-steel construction.

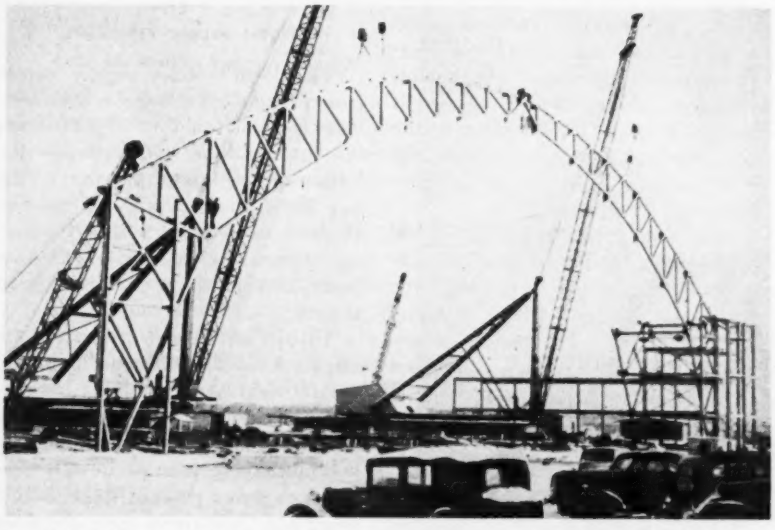


Fig. 3. Erecting one of the 275-ft. span arch trusses. Each traveler raised a half arch, and connections were made on a pin at the center and to gusset plates at the haunches.

Spanish Harbor Program Calls for Big Expenditure

Work on the harbor repair and construction program of the Spanish federal government has been delayed by financial and operational difficulties, but it is reported that the first stage of the work is now nearing completion. The development provides for repair and renovation of port installations damaged during the civil war. The total cost is estimated at $19,200,000.

In the port of Bilbao the quays have been repaired, the external harbor basin is being dredged, and repair work is also underway in the fishing port. In San Esteban de Pravia extensions are carried out for the movement of coal and ore. In Vigo quays and wharfs are being repaired and enlarged, and a new harbor basin is being built. In Sevilla work on the locks of Corba de Tablada are approaching completion, while dredging proceeds in the Guadalquivir River. In Cadiz the quays are being extended, and in Barcelona a big emergency repair program is still in progress. Likewise repairs are also still awaiting completion in Valencia and Almeria.

Later, construction is to be undertaken at Pasajes, Santander, Seville, and at Melilla, the Moroccan ore shipping port. The larger part of the expenditure during the second and third stages, which are to cost $10,350,000 and $46,000,000 respectively, will be for dredges, cranes, elevators, and other equipment. Work during the third phase will include the building of a large drydock for ocean-going ships, but no decision has been made as to where the dock is to be located.

Because of war, public works offices in San Diego's beautiful city hall are occupied early and late.

San Diego Faces 1960's Problems Today

***Contents in Brief**—Engineering studies of future water supply, sewerage and traffic requirements for San Diego, Calif., always assumed a population of 350,000 by about 1960. When war created such a population by 1942, unprecedented and unexpected problems faced the city's engineers. The water distribution system had to be enlarged, a new supply reservoir built, sewage treatment inaugurated, and traffic facilities improved. Difficult at best, the multitudinous tasks are complicated by inability to get materials and equipment.*

SAN DIEGO, one of the most beautiful and civic-conscious cities in the United States, had a population of 202,000 in 1940. In less than two years, because of the expansion of local war plants and military establishments, this figure has jumped to the neighborhood of 350,000. No other major American city can match such a growth, and only Norfolk, Va., can challenge it closely. For once, San Diego is not "enjoying" a population increase. This one is too full of trouble.

What such a transformation can mean in terms of new municipal problems, any engineer can imagine. The average San Diego citizen, on the other hand, probably has been unaware of any dislocation, save in traffic. If he drives, he has been caught in the snarl of cars at shift-change hours, and if he walks he has encountered crushing crowds of workmen, soldiers, sailors and marines at any time of the day or night. Yet, so far, he has had all of the water he wants, and his sanitary facilities, which have concerned him as little as they have the citizen in any community, still cause him no worry. If he is a newcomer he may have lacked a house for a time, but even that difficulty is now being dissolved. It is when one looks at the problems through the eyes of Fred Pyle, city hydraulic engineer, Paul Beermann, his assistant, H. W. Jorgenson, city engineer, B. D. Phelps, assistant city engineer in charge of sewage work, or the engineers of the city planning commission, that the seriousness of the situation comes into focus.

San Diego is building a $3,550,000 dam on San Vicente Creek to provide a new storage reservoir to add to the five that it has now. It is spending $1,300,000 of its own money for new supply and distribution mains and booster stations, and the Federal Works Agency is contributing an additional $2,071,000 for the same purpose. The city is building a $770,000 sewage treatment plant and, in conjunction with the WPA and the Navy, a $1,500,000 interceptor sewer that will clear the bay of raw sewage outfalls. In cooperation with the state highway department it is widening its principal arterial street along the bay and building a grade separation at the worst crossing. And in partnership with the federal government it is handling a dozen war housing developments totaling over 10,000 units, more than any other city in the country. To the normal difficulties that would attend a municipal improvement program of this magnitude at any time are added the problems of rush construction and of materials shortages and delays that characterize wartime. From any standpoint San Diego is a war-troubled community.

Water supply reservoirs

San Diego's water supply comes from impounded storage in five reservoirs located from 6 to 40 miles from the city on three river systems—the Cottonwood-Otay to the south; the San Diego to the east; and the San Dieguito to the north. From the lowest reservoir on each river, pipelines bring the water to the city distribution system.

All of San Diego's reservoirs are rated not only in total capacity but on a safe yield basis as well. Extreme importance attaches to the safe yield figures because the major runoffs that will fill the reservoirs occur only once in ten or eleven years. On the Cottonwood and Otay rivers there are three reservoirs and dams. Morena Dam, farthest upstream on the Cottonwood, is a rockfill structure built in 1910

and forming a 67,211 acre-ft. reservoir, capable of delivering a safe yield over a ten-year period of 5 mgd. Next downstream is Barret Dam, a curved gravity structure built in 1923 and forming a reservoir of 42,796 acre-ft. and affording a safe yield of 4.8 mgd. Water from this reservoir is delivered through a conduit into a branch of the Otay River and thence into Otay reservoir, formed by the construction of Savage Dam in 1917. Savage Dam is of curved gravity type and forms a 56,314 acre-ft. reservoir affording a safe yield of 3.8 mgd. The total safe yield from this system is, therefore, 13.6 mgd., which is delivered to a 13-mgd. filter plant at Savage Dam and thence 19 miles to a balancing reservoir in the city at University Heights. This Cottonwood-Otay system was the original water system of the city.

On the San Dieguito River, 37,533 acre-ft. of storage is effected by Hodges Dam, a multiple concrete arch structure built in 1918 and affording a safe yield of 3 mgd. to the city. Water from this reservoir passes through a filter plant at the north city line and thence into the distribution system.

Water from the San Diego River is conserved by El Capitan Dam, a hydraulic fill and rock embankment completed in 1935, which affords 116,448 acre-ft. of storage and a safe yield to the city of 10 mgd. Water from this reservoir is delivered through a 25-mile line to the University Heights reservoir and a 16-mgd. filter plant at that location built in 1928.

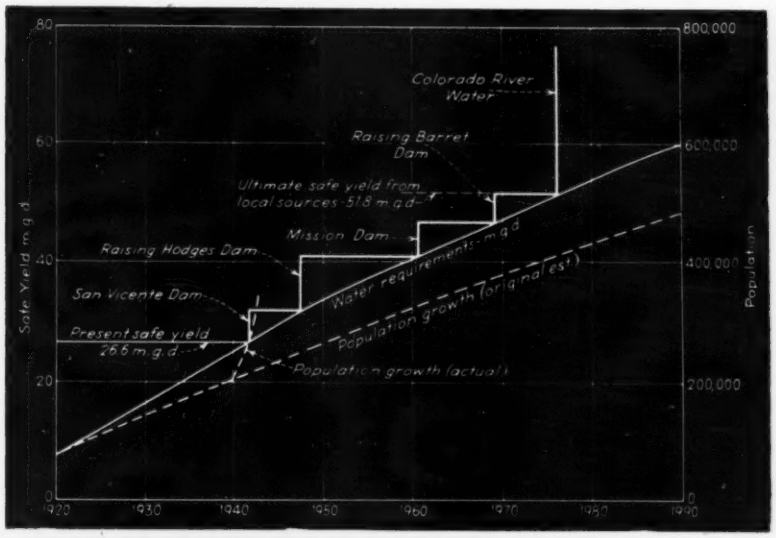
Lots of water, but not enough

Were it not for this impounded water San Diego would revert to the desert which hems it in against the Pacific Ocean. But by starting the war when he did, Hitler chose a time when even the greatly increased water demand engendered by war preparations offers no immediate threat in this direction. Every one of the city's five reservoirs is full to the spillway, a supply sufficient to last for three years even if no rain should fall in the meantime. And, on the basis of past experience, a year of major runoff should occur near the end of this three-year period to replenish the supply.

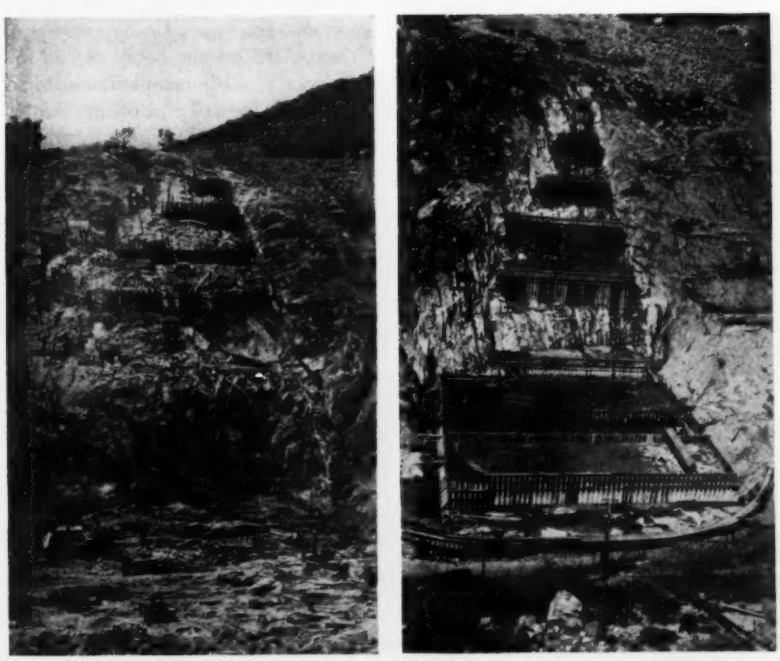
Why then is San Diego faced with a water problem? There are two reasons: One is that the total present safe yield of 26.6 mgd. is only sufficient for a population of 250,000 instead of the 350,000 that must be served. The city has delivered as much as 46 mgd. this year, and its monthly demand is consistently running 40 to 50 percent over last year's, which equaled or exceeded the safe yield. Prudent operation requires, therefore, that the safe yield be increased by developing new storage.

In an emergency, however, safe yield can be exceeded for a time, which is the practice now being followed by San Diego. But even this does not solve the second problem, which is an inadequate distribution system. In an effort to solve this one, six major projects are underway. Most vital is the Alvarado pumping plant, a booster station on the El Capitan supply line. Being rushed toward completion, this project is having priority trouble, rating no better than A-7, which produces the badly needed valves only with difficulty.

Installation of two 16-in. pipelines to serve the harbor front represents



How San Diego charted future development of its remaining local water resources only to find that a war-increased population forced it to face 1960's water demands today.



A month's progress on San Vicente Dam, being built to augment San Diego's water storage. By pressing construction it is hoped to catch next winter's runoff.

the second most important project. One of these lines terminates in a new 10-mg. balancing reservoir which, when placed in service and operated in conjunction with the existing 10 mg. reservoir at University Heights, will assure that a major part of the city's system can be stepped up to maximum supply and pressure. The fourth project is a replacement of a section of 18-in. wood stave pipe feeding the northerly portion of the city, while the fifth is an improvement to the main supply line from Otay reservoir. The latter is of interest because it replaces the last large wood stave pipe in the city's system, which dates back to 1905. The final project, and one of the largest, is made up of 50,000 ft. of 48-in. concrete-protected steel cylinder main paralleling the existing supply line from El Capitan Dam.

New reservoir to augment supply

These water distribution system improvements comprise the short-term necessities, and must be speedily completed if San Diego is to keep its war activities going. The somewhat longer-term need of more storage, however, is not being neglected, and San Vicente Dam on a tributary of the San Diego River below El Capitan Dam is the first project selected to meet it.

To augment its supply, San Diego had the choice of bringing in Colorado River water or of starting development of the few remaining local impounding sources. The city and county are entitled to 100 mgd. from the Colorado River, which can be obtained either by building a 78-mile conduit from the Colorado River Aqueduct that serves the Los Angeles Metropolitan District, or by constructing a 96-mile conduit and tunnel from the westerly end of the All-American Canal across the mountains in Imperial Valley. In 1937, a board of engineers under the chairmanship of Louis C. Hill rendered a report to San Diego that concluded that the local sources should be developed before Colorado River water was brought in, and it is significant that the city has elected to follow this portion of the recommendations of this report.

It may be pointed out that the report charted a four-part development consisting, in sequence, of raising Hodges Dam to give an additional safe yield of 9.7 mgd.; of building San Vicente Dam for 5-mgd. safe yield; of building Mission Dam on the lower San Diego River for a 6-mgd. safe yield; and of raising Barrett Dam to increase the safe yield of Barrett reservoir by 4.5 mgd. All of these improvements together would add 25.2 mgd. to the present safe yield of 26.6 mgd. San Diego has put the construction of San Vicente Dam ahead of the raising of Hodges Dam, but otherwise, and in principle, it has embraced the board's program.

That San Diego needs more sewerage facilities is clearly shown by this view of manhole covers on Pacific Highway being lifted by sewage that is flowing in the lines under pressure.

San Vicente Dam, being rushed for a February, 1943 completion date so as to catch the tail end of any winter runoff, is a straight concrete gravity section dam, 950 ft. long at the crest and 200 ft. high. A 275-ft. wide spillway is accommodated in the center of the structure. When completed, the dam will impound a reservoir of 75,000 acre-ft. A special item of interest is that the dam is being built faster than a highway in the valley can be relocated at higher level and, as a consequence, a 22-ft. wide by 20-ft. high opening is being left in the dam to accommodate the road temporarily.

Despite development of local water sources, however, the great increase in population and water use will not permit San Diego to postpone much longer the bringing in of water from the Colorado River. The alternative is to court disaster in the event of a repetition of the 1897-1904 drought, when there was practically no runoff from the local drainage areas for seven consecutive years. As now controlled by Boulder Dam, the Colorado River is a very dependable source of water supply, drought or no drought.

Sewage problem critical

Grave as it is, the water supply situation in San Diego is probably not as immediately serious as the sewage disposal problem. For many years the city has dumped its sewage into the bay untreated. With an average population of 175,000 throughout the 1930–40 decade, the results could be tolerated, but with twice that population the bay had to be cleaned up. A federal-aid project of considerable magnitude is, therefore, underway.

Most important element of the new sewage system is a tile-lined concrete-pipe interceptor paralleling the bay front for 51,000 ft. or nearly 10 miles. Of 60- to 45-in. diameter, it is being financed by the WPA, the Federal Works Agency, the Navy and the city, each building about a fourth of the line.

Sewage picked up by this new interceptor will be carried to a treatment plant that the city is building at the south end of the line. The plant is designed on a basis of 375,000 population. With equipment to be installed initially, it will handle 40 mgd. Both plant and interceptor will be ready by the end of this year.

Sewage plant features

The sewage disposal plant for San Diego, designed by the city engineer's office, is unusual, and in one respect, at least, novel. Designed to provide primary treatment, it employs sedimentation combined with mechanical flocculation; for this purpose three 100-ft. dia. tanks will be used, each of which is equipped with an annular compartment for flocculation by means of motor-driven paddles.

The novel feature of the plant is the use of a new "vacuator" process in which the tank effluent will be treated for the removal of grease prior to its discharge into the harbor. Details of the process cannot be revealed at this time, but it can be said that it involves separation of grease by means of air diffusion.

Other steps in the treatment process include two-stage digestion of sludge, dewatering by means of elutriation and vacuum filtration, and flash drying of sludge. Work on these sewage

facilities is 80 percent complete.

In addition to the interceptor and disposal plant work, which is going ahead, the city has also voted $1,983,000 in bonds for a sewer line from La Jolla, near the north boundary of the city, to connect with the interceptor, and for about a dozen other lines in various parts of the city. This work is less essential than the interceptor and the treatment plant and, to date, has no priority for materials that would permit it to go ahead.

Housing on a big scale

So far as vacant land is concerned, San Diego was ready for its great population increase. The city covers 95 square miles, and is 20 miles long from north to south. There has been plenty of room, therefore, for the necessary government and private housing. And this has been provided in great quantity. Nearly 6,000 housing units were built by private capital last year, and it is claimed that the federal government has built more war housing in San Diego than in any other United States city.

Existing government housing totals 5,776 units in six projects. Then there are 1,750 units in single men's dormitories divided among three projects, and two government trailer camps accommodate 550 families. Finally, just getting underway, is housing for 3,300 more families in six projects, either new or additions to existing layouts. This makes a total of over 11,000 war worker houses that have been provided in San Diego by the federal government.

Largest single developments are PBA's Linda Vista project, originally of 3,000 units and now being expanded to 4,500, and Bay View Terrace, a 1,100-unit demountable house layout of the FWA. Linda Vista is a complete village with a separate water reservoir and elevated tanks served by the city, a sewage treatment plant, stores and schools. The latter are far from adequate, however, and a large school building program is now underway.

Another interesting fact with respect to San Diego housing is that the single men's dormitories have not been overly successful for their originally intended use, namely, as homes for factory workers. Only about half the units are occupied by workers, the remainder now serving Army and Navy personnel. Apparently the single men would rather rent rooms in San Diego homes than live in dormitories.

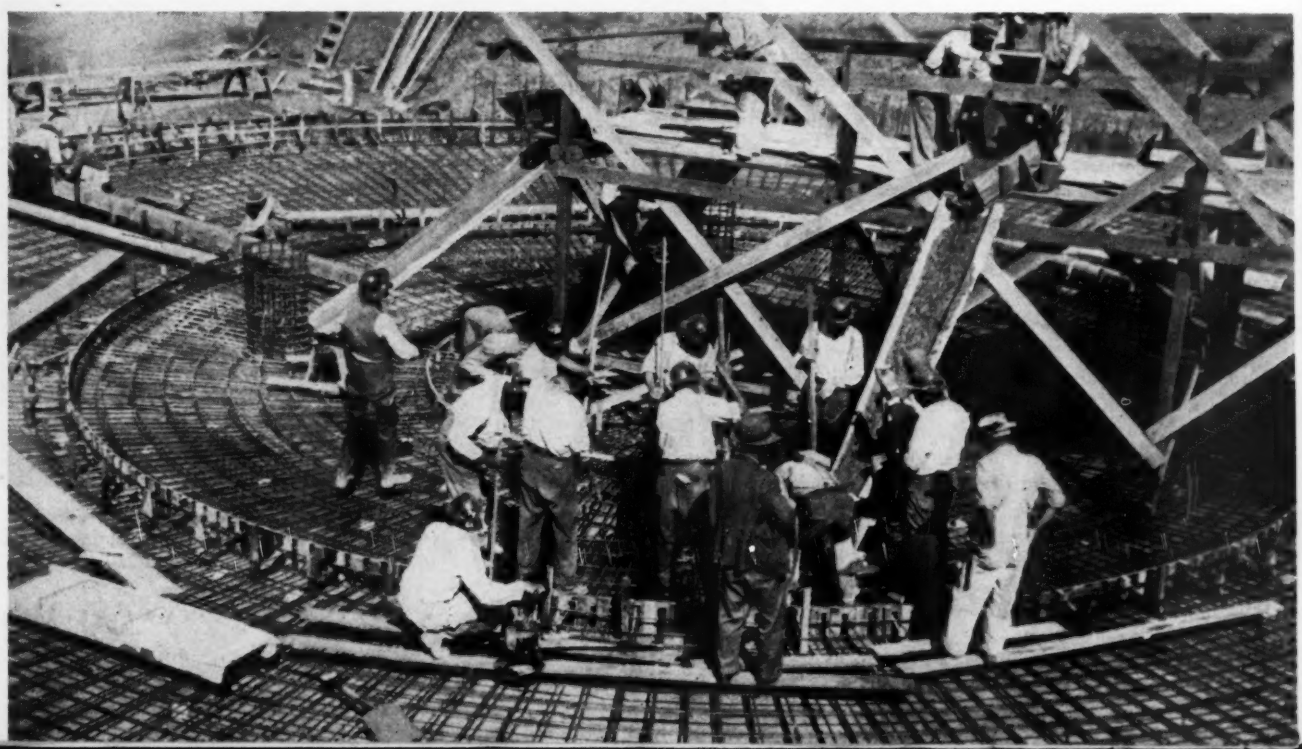
San Diego still lacks housing accommodations and, with no more federal funds in sight and little inclination for private builders to take up the slack, the solution of the problem is not in sight. There is one possible ray of hope—that the new workers required will be women who already live in San Diego. If women can take the place of men called to the armed services and supply the extra "manpower" that the war industries may need from now on, San Diego's housing expansion can, it is believed, be held within reasonable bounds.

Traffic

On top of the water, sewage and housing problems, San Diego has to deal with traffic that has swelled beyond all predictable volume. The fact that a great proportion of it is channeled into an arterial highway along the bay increases the difficulty of a solution. At present this road is being widened from 60 to 100 ft. throughout its ten-mile length and provided with a dividing center strip. Also, at one important crossing a grade separation is being built.

In an attempt to cut down the auto traffic the local street car company is putting abandoned lines back into service and is extending spurs to the war plants. For operation on these lines old street cars have been purchased from as far away as Wilkes-Barre, Pa., and New York City. Even with these improvements transportation in San Diego will still be difficult and inefficient. There is neither time nor money to make it otherwise. And if ideal solutions are being sought for water, sewage and housing, the same lack of time and money stands in the way. Workable solutions are, however, being arrived at in all of these fields to an extent that permits San Diego to speak with pride as to its contribution to the war effort.

Placing concrete in one of the three 100-ft. dia. flocculator tanks that are part of San Diego's new sewage treatment plant.



Wall and Column Footings Without Steel

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***Contents in Brief**—Scientific methods for designing plain concrete footings for columns and walls are developed. Charts showing step-by-step procedure are presented as an aid to rapid work. Data are made available for comparing the material and labor required in building both plain and reinforced footings.*

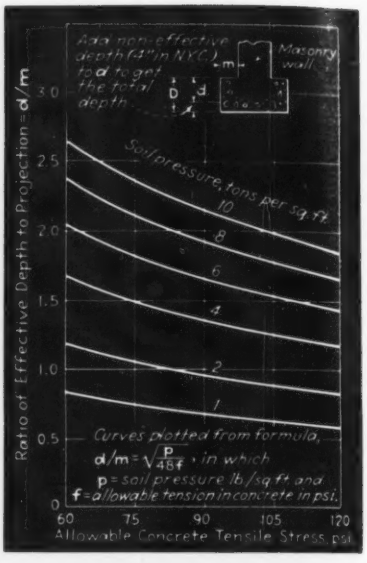

Add nominal effective depth (4" in N.Y.C.) to get the total depth
Masonry wall
Ratio of Effective Depth to Projection = d/m
Soil pressure, tons per sq. ft.
Curves plotted from formula, d/m = √(P/48f), in which
p = soil pressure lb./sq. ft. and
f = allowable tension in concrete in psi.
Allowable Concrete Tensile Stress, psi.

Fig. 1. Design of plain concrete footings for walls is simplified by above chart. Curves could easily be extended to aid design for other conditions.

USE OF REINFORCED CONCRETE has enjoyed such a phenomenal and well-deserved growth since the beginning of the century that in some types of construction, notably spread footings for columns, no alternative is normally considered. However, with reinforcing steel now high in price and difficult to obtain, the fact that plain concrete footings may be satisfactory in many places and under certain conditions should not be ignored by the designer.

For many years the "design" of a footing in plain concrete consisted of the rule-of-thumb "make the depth twice the projection." Such a design, while considered safe for moderate soil pressures, is decidedly unscientific, since neither the strength of the concrete nor the pressure on the soil are considered. In this matter the present New York City building code exhibits a decided advance over its predecessor, for the design of plain concrete footings is now specifically covered.

The current code requires, "In plain concrete footings the stress due to bending at any section away from the face of the supported wall or pier—on a depth 4 in. less than the footing thickness—shall be within the safe modulus of rupture taken as .03f'_c. . . ." The code specifies further that, "The critical section for bending in a concrete footing, which supports a concrete column or pedestal, shall be considered to be at the face of the column or pedestal. Where steel or east-iron column bases are used the moment in the footing shall be computed at the middle and at the edge of the base: the load shall be considered as uniformly distributed over the column or pedestal base."

Mention of plain concrete footings is also made in *Recommended Practice and Standard Specifications For Concrete and Reinforced Concrete*, which is a 1941 joint report of a committee representing the American Society of Civil Engineers, American Society of Testing Materials, and other engineering groups. These specifications provide that "In plain concrete footings the section should be computed as a monolithic section of the entire width and depth measured from a plane 2 in. above the bottom of the footing. The maximum tensile fiber stress in the concrete should not exceed 0.03 of the ultimate compressive strength of the concrete. The average shearing stress should not exceed 0.02 of the ultimate compressive strength of the concrete, computed on a concentric vertical section through the footing at a distance d = 2 in. from each face of the column, pedestal, or wall, excluding 2 in. of depth nearest the bottom."

To facilitate the design of plain concrete footings the writer has prepared the diagrams shown in Figs. 1 and 2. The first diagram deals with wall footings and gives the required ratio of depth-to-projection for a

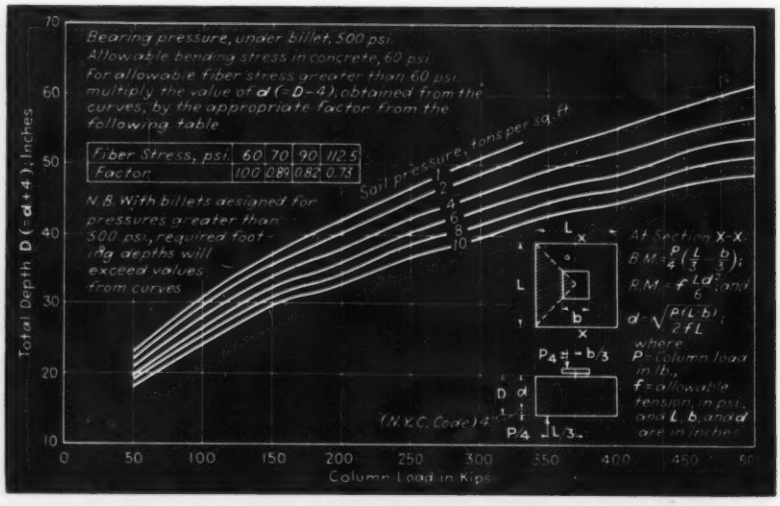

Bearing pressure, under billet, 500 psi.
Allowable bending stress in concrete, 60 psi.
For allowable fiber stress greater than 60 psi. multiply the value of d (= D − 4), obtained from the curves, by the appropriate factor from the following table
Fiber Stress, psi. 60 70 90 112.5
Factor 1.00 0.89 0.82 0.73
N.B. With billets designed for pressures greater than 500 psi., required footing depths will exceed values from curves
Soil pressure, tons per sq. ft.
Total Depth D (= d + 4), Inches
Column Load in Kips
At Section X-X, B.M. = P/4 (L/2 − b/2); R.M. = f L d²/6, and d = √(P(L−b)/2fL); where P = Column load in lb., f = allowable tension in psi., and L, b, and d are in inches
(N.Y.C. Code)
P/4
P/4 = b/3
P/4 = L/3

Fig. 2. In designing plain concrete footings for columns this chart is very helpful. Irregularities in the curves were introduced by selecting commercial size plates for the metal column bases.

range of soil pressures and for a number of different design stresses. The ratio d/m, obtained from the diagram for any particular soil pressure and allowable bending stress, when multiplied by the projection in inches gives the required effective depth in inches. To this effective depth there must be added whatever cover is required by the code governing the design.

The diagram designated Fig. 2 is for use with square-block footings directly supporting metal column bases. In the preparation of the diagram, the area of the bearing plate was determined on the basis of 500 psi. bearing pressure for any superimposed load. A commercial size plate was then selected, which introduced the irregularities in the curves. The critical section for bending moment was taken at the center of footing and the bending and resisting moments computed and equated as indicated.

It will be noted in Fig. 2 that the curves show the total required depth, which is designated D, as 4 in. over the theoretical depth. This is as required by the New York City code. The adjustment for a less conservative cover requirement involves only a simple subtraction. Determining the length of the side of the footing, L, is an easy matter, once D is known. First subtract 12 D from p, the allowable soil pressure, and obtain p', which is the net soil pressure available to support the column load. Then $L = 12\sqrt{P/p'}$ in inches.

While the curves of Fig. 2 have been plotted for only a tensile stress of 60 psi., they can be used for other allowable stresses. This is done as follows: For any particular superimposed load and soil pressure, read the required total depth, D. Then from D subtract 4 in. to get d, which must then be multiplied by the appropriate conversion factor given on the diagram. To the reduced d add 4 in., or other cover required, and obtain the new total depth.

Changing a wasteful design

A plain concrete footing "stepped and built monolithic" to support a column load of 350,000 lb. on a soil whose bearing value is 3,500 lb. per sq.ft. is shown by Fig. 3. This design was copied from a widely used handbook of building construction. The footing requires 22.9 cu.yd. of concrete, 286 sq.ft. of forms, and excavation has to be carried to a depth of 9 ft. 4 in. below the top of the footing.

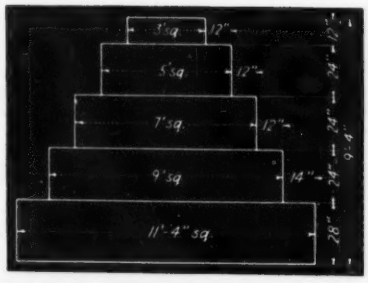


Fig. 3. An engineer's handbook recommended this design for a plain concrete footing "stepped and built monolithic" to support a 175-ton column load on a soil with a bearing value of 3,500 lb. per sq. ft.

Fig. 4. Plain concrete footing designed by the author for the same column load as the footing of Fig. 3.

A footing designed by the method of this article to meet the same loading conditions is shown by Fig. 4. The depth was interpolated from Fig. 2, and the plan size calculated from $L = 12\sqrt{350{,}000/(3{,}500 - 12\text{x}53)}$, where L is given in inches. This design calls for 20.1 cu.yd. of concrete, 196 sq.ft. of forms, and excavation to a depth of 4 ft. 5 in. below the top of the footing. Thus, there is a decided saving in labor and materials.

Admittedly, a much greater depth is required by a plain concrete footing than by its reinforced rival, and usually this extra depth of concrete will entail the expense of additional excavation. However, not infrequently, in order to build on a satisfactory soil stratum, a greater depth of excavation is necessitated than would be required merely by the footing's thickness. When this condition rules, the plain concrete footing compares more favorably. This is because excavation costs become practically equal for both the plain and the reinforced foundations, and the thickness required for the plain concrete footing decreases considerably due to the effect of the superimposed concrete pedestal.

Post-War Planning Programs Begun by New York and New York City

New York's new State Commission for Post-War Public Works Planning, created by a law signed by Governor Lehman early in May, provides the first machinery for state post-war planning to be established by statute, according to the American Society of Planning Officials.

Feature of the planning program under the commission is the coordination of funds and authority for keeping records and specifications on all state planning projects hitherto handled separately by various state departments. Object of this coordination is to make easily available at all times an overall picture of employment and cost estimates, and materials and equipment needed for execution of the projects.

The commission also is to prepare and maintain progress reports on post-war plans of municipalities in the state, and to maintain connections with federal officials and agencies concerned with post-war planning.

In setting up the commission, the legislature also appropriated $450,000 to be spent in preparing plans for post-war construction projects, and authorized creation of a building reserve fund of about $320,000,000 through sale of state highway, grade-crossing and housing bonds.

The commission will consist of the director of the state bureau of planning, representatives of other state departments, and the chairmen of several legislative committees.

In a post-war works program proposed separately by the New York City planning commission, new construction for which funds are recommended totals $628,000,000, with $21,600,000 set aside for planning for the improvements. The list of projects is proposed not for budget purposes but as a planning program to be advanced as rapidly as possible in terms of financing and paperwork, though actual building may be postponed for a long time. Except for essential projects related to the war or not requiring critical materials, nearly all new municipal construction in New York City has been stopped.

War Job Maintenance Plan Conserves Vital Construction Machines

Contents in Brief—*On a 100-sq. mi. Army construction site, the work of the architect-engineer-manager includes maintenance of 482 mobile machines. At the start of operations the contractors enclosed an 1,800x1,800-ft. area with wire-mesh fence within which three buildings were erected for inspection and repair of heavy equipment, trucks and passenger cars. In addition, eight pickup trucks were equipped with repair equipment and designated to travel over the site to make minor repairs that might otherwise take a unit out of service for several hours.*

IMPRESSED by the present difficulty of obtaining construction equipment, and by past experience that proved the great value of periodical inspections and quick repairs of mobile machinery, one of the first acts of the architect-engineer-manager engaged in about one-third of the construction on a big War Department project was to provide complete repair facilities for mobile equipment. The latter total 482 units, half of which are trucks and passenger cars and the remainder heavy equipment. Near one corner of the 100-sq.mi. site an 1,800x1,800-ft. plot was enclosed by an 8-ft. high wire-mesh fence and designated the repair area. From $20,000 to $30,000 was invested in new buildings and equipment to provide the desired repair facilities.

For repair of heavy equipment a wood-frame, 60x100-ft., semi-permanent building was built near one corner of the site (Fig. 1). Both sides of this structure are made up of 18x16-ft. sliding doors, and the roof is equipped with cupolas that permit the escape of motor fumes and odors. Along each end of the building, built-in tool chests and shelves for storing repair parts are available. The roof framing supports a trolley crane and chain falls on a controlled pulley supported by light-weight I-beams running the long way of the building in each of the two bays.

Below the reinforced-concrete floor are located two lighted 3½-ft. wide pits 4 ft. deep and 18 ft. long. Each of these will have covers in sections 6 ft. long to prevent accidents when the pits are not in use. Near the building is located a 20x24-ft. wood-frame structure serving as the central office for all the men employed in repairing, maintaining and operating the heavy equipment.

Car and truck facilities

Repair of the passenger cars is to be handled by special crews working in a new 50x100-ft. wood-frame building (Fig. 2), which has both sides made up of swinging doors providing a 10-ft. vertical clearance and 9 ft. horizontal. In the floor are located two 3x4x16-ft. pits, which will be provided with covers. The roof framing of this building is sufficiently strong to support the necessary hoists.

For repair of trucks still a third wood-frame structure of semi-permanent construction was built (Fig. 3). It measures 30x130 ft., is closed at the back and open at the front. A 16-ft. clearance is provided both horizontally and vertically, and two pits similar to those in the passenger car garage are available. Here also the roof framing is sufficiently strong to support the necessary hoisting equipment. As an office for the men employed in repairing cars and trucks, a nearby 20x24-ft. structure was built. Likewise a 40x100-ft. barn on the site was remodeled to provide a storage area for passenger car and truck parts.

All men reporting for the repair of any piece of mobile or heavy equipment check in at a central time office. Two ten-hour shifts are employed and, in all, about 34 mechanics and helpers are required for the cars alone. The same number of men are used for the trucks, and 51 men are detailed for heavy equipment repairs. Use of all the passenger cars and trucks is allocated through a single dispatcher's office, one man controlling the assignment of trucks and another passenger cars.

Frequent equipment inspections

The method followed with the heavy equipment is to inspect every machine twice daily at the site where used. This inspection is made by a mechanic and his helper traveling in a pickup equipped for battery service and minor repairs. Two such service trucks are designated for heavy equipment alone.

Each truck is equipped with the following items considered necessary for field repairs: one kit of tools consisting of sockets and box sockets, end wrenches, hydraulic jacks, hammers, chisels, a supply of nuts, bolts, washers, and those new parts deemed to be required most often; a tow line; and a supply of gasoline, oil and grease. In the event that field repairs are not practicable, the disabled machine is towed or transported to the heavy equipment garage, where the necessary repairs are made.

For supplying fuel to the heavy equipment, four trucks, each equipped with a 1,200-gal. gasoline tank and two trucks provided with 1,200-gal. tanks for diesel fuel, are used. These trucks are also fitted to do all necessary oiling and greasing work. The trucks are scheduled to do as much fueling and greasing as possible at night in order to prevent delays. For that reason the trucks are completely equipped with lighting facilities. The crew of each unit consists of the driver and his helper.

Each passenger car and truck is serviced and inspected every night as to the condition of oil, gas, tires, water and batteries. In addition, each 1,000 miles of travel or every seventh day, whichever comes first, the trucks and cars are given a detailed inspection, a complete lubrication and an oil change.

All new equipment is thoroughly tested before it is put into actual field

service. A surprising number of adjustments and repairs are found necessary before the new units can be placed in operation. Each piece of second-hand machinery likewise is completely overhauled before use. Although this takes time and often makes the first cost high for some pieces of equipment, it results in great savings, since very often a minor repair will avoid major trouble at a later date. Furthermore, to have a unit break down in service often results in a bigger loss in halting some important operation than the cost of repairing the disabled machine.

Still another measure that has proven very worth while, although requiring considerable bookkeeping, is a cost record as to repairs and fuel for each machine. These data are broken down as to cost per mile for the trucks and passenger cars, and cost per unit quantity of work done with the heavy equipment. These records not only keep the contractor informed as to how his costs are running, but they also supply data important in comparing different types of machines and often serve to reveal an inefficient, careless operator. At the same time the records provide the contractor with valuable information for bidding on other jobs.

Pooling of cars and trucks

Still another practice that aids in reducing operation costs is that of pooling all trucks and passenger cars. This means that no car is designated day after day for the same individual without making sure that he actually needs the car each day of the week. Furthermore, the pooling gives assurance that all the cars are at the garage when not in use. This plan provides numerous opportunities for frequent adjustments and minor repairs that result in large future savings.

Requests for cars must be made by four o'clock on the day previous to the time the car is needed. Thus, each driver when he leaves the project in the evening knows where he is to drive the next day and with what car.

With the heavy equipment there is also a pooling arrangement. Each machine is allocated several days in advance—often as much as two weeks—as to where it is to be used. This avoids delays due to equipment shortages and shutdowns, and each unit is in service the maximum possible number of hours. Making allocations several days in advance also permits sufficient study as to which machine can do a job most economically. The heavy equipment is allocated by the equipment superintendent in the field and thus by the individual most familiar with all the varied needs.

The practice of giving each piece of heavy equipment a complete check-up when it is in the garage for a minor repair has proven most worth while, since certain troubles are eliminated before they have had a chance to become serious.

For military reasons, the exact location of the site may not be given, nor those in charge mentioned.

Fig. 1. For repair of heavy equipment a 60x100-ft. wood-frame, semi-permanent structure was built. Note shelves and storage facilities at the ends of the building.

Fig. 2. This 50x100-ft. wood-frame building is for repair of passenger cars. The doors for the near side have been left off temporarily, those for the opposite side are in the closed position.

Fig. 3. Trucks will be repaired in the 30x160-ft. structure above. The roof framing was designed to support the hoisting equipment to be employed.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Welding a ½-in. rod along the edge of this workbench prevented the loss of machine parts.

Raised-Edge Workbenches

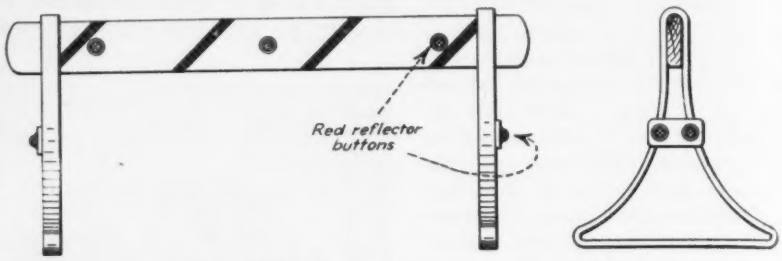
To prevent the loss of small parts, such as balls and rollers, when overhauling equipment on a heavy steel workbench, the welder on a Texas project added a rail or guard at the edge of the bench, as shown in the accompanying photograph. The guard, which effectively stopped scattering of the parts, is composed of a ½-in. round rod welded to the steel working surface of the bench. The welding bead is on the inner side of the rod to prevent work from catching under the guard and being damaged.

On one end of the bench the rail is some 15 in. short of the corner to permit brushing of the dirt off the bench and to allow rain that falls on the working surface to drain away. The rod does not interfere with use of the broad bench surface; instead the slight lift given flat objects by the round rail permits the insertion of a pinch bar, or even of the hook on the chain used to maneuver heavy equipment.—ELTON STERRETT, *Box 6536, Houston, Texas.*

No More Lanterns on San Francisco Street Repairs

San Francisco now has a municipal ordinance, due to the necessity of occasional blackouts, which provides for the use of reflector buttons on all "street closed" barriers marking trenches, pavement cuts, etc. Heretofore such barriers have been marked during hours of darkness with lanterns.

The cost of daily maintenance of the lanterns, the frequency with which they are stolen or broken, and the fact that a very large part of the protection they afford can be provided as well by red glass over reflectors that throw back the beam from automobile headlights, has made it seem satisfactory to do away with the lanterns altogether. The accompanying sketch shows the preferred arrangement of the reflector buttons.



Reflector buttons now take the place of lanterns for night lights on San Francisco street barriers of this type.

Shipyard Scrap Salvage

All metal scrap at the Oregon Shipbuilding Corp. yard is gathered by the clean-up crew and loaded into heavy timber boxes left in convenient locations around the yard for this purpose. The boxes, when full, are taken to a scrap pile where roustabout labor is used for sorting the material. In addition to many small pieces such as rivets and bolts that can go directly back into stock, there are many items that can be reconditioned and used again. Even in the scrap heap itself a certain amount of segregation is possible by dumping different kinds of scrap in different locations. Thus, whenever need for some "special" arises, the scrap pile is visited and often just the necessary piece or part can be found. Scrap that is not likely to be used is periodically shipped away for remelting.

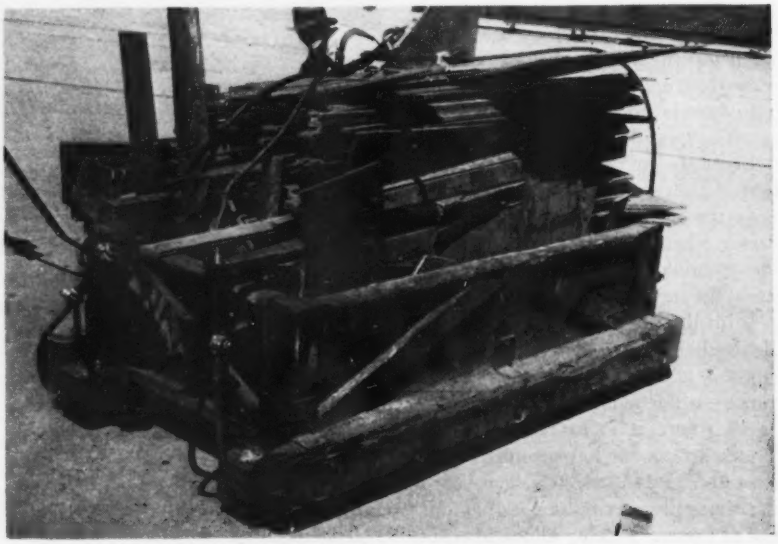


Fig. 1. Heavy timber boxes are loaded with scrap metal in the continual clean-up.

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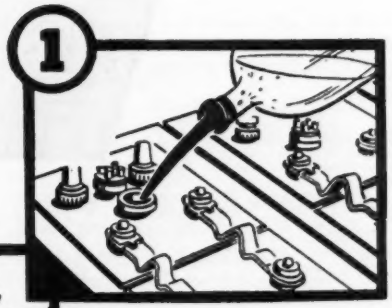
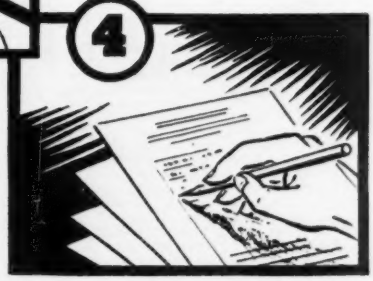
Keep the battery fully charged — but avoid excessive overcharge. There's always a right-way to do any job, and a storage battery will last longer when charged at its proper voltage.



Keep adding approved water at regular intervals. Most kinds of local water are safe in an Exide Battery. Ask us if yours is safe.



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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

AIRPORT PAVING, DRAINAGE AND GRADING, PENNSYLVANIA

OWNER: U. S. Engineer Office in conjunction with Civil Aeronautics Administration, Philadelphia, Pa.

PROJECT: Construction of landing strips, runways, taxiways, apron area and graded areas inclosed by and adjacent to above items at airport in Pennsylvania. Main features are removal of structures, clearing and grubbing, grading, and top-soiling in the grading contract; and field drainage, underground electrical duct, preparation of subgrade, 6-in. gravel sub-base course, 4-in. dry-bound macadam base course, bituminous prime coat, 2-in. asphaltic concrete surface course, and seal coat in the paving and drainage contract.

CONDITIONS: Contractor to furnish all materials and complete the grading portion of the contract in 70 days, and the paving and drainage portion in 100 days. Rail, highway and water transportation facilities available near site of work. Wage rates are: skilled labor $1.25 to $1.82½ per hr.; semi-skilled, 80c. to $1.00; and unskilled, 77½c.

BIDS: Two bids were received April 6, 1942 on the grading work, the contract low of $461,144 and $499,409. Four bids were opened April 28, 1942 on the paving and drainage work, ranging from the contract low of $449,341 to $534,831. Engineer's estimates were: $308,611 for grading, and 478,056 for paving and drainage.

Grading

LIST OF BIDDERS: Bids opened April 6, 1942.

1. James D. Morrissey, Philadelphia, Pa. (contract) $461,144.00
2. C. T. Burket, Vineland, N. J. 499,409.00

Item	Quan.	Unit Prices (1)	(2)	(3)*
1. Removal of structures	L. S.	$1,000.00	$10,000.00	$2,000.00
2. Clearing and grubbing	L. S.	19,920.00	8,000.00	5,000.00
3. Unclassified excavation	1,175,700 c. y.	.32	.37	.23
4. Topsoil	160 ac.	400.00	290.00	195.00

**Engineer's estimate*

Paving and Drainage

LIST OF BIDDERS: Bids opened April 28, 1942.

1. John Meehan & Son, Philadelphia, Pa. (contract) $449,340.50
2. Union Paving Co., Philadelphia, Pa. 458,888.00
3. Union Bldg. & Constr. Corp., Passaic, N. J. 498,168.50
4. Del Balso & Sprague, Inc., New York, N. Y. 534,830.75

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 6-in. gravel sub-base course	39,100 c. y.	$2.00	$2.00	$2.10
2. 4-in. dry-bound macadam base crse	31,050 c. y.	4.00	3.95	4.50
3. Bituminous prime coat	65,900 gal.	.15	.12	.10
4. 2-in. asphaltic conc. surf. crse	175,300 s. y.	.70	.77	.82
5. Rapid curing cut-back asph. (seal)	44,000 gal.	.17	.10	.10
6. Cover aggregate for seal coat	1,250 ton	3.00	2.00	2.25
7. 8-in. vit. clay or conc. sew. pipe, sealed joints	1,100 l. f.	.56	.62	.80
8. 12-in. vit. clay or conc. sew. pipe, sealed joints	9,600 l. f.	.79	.75	.90
9. 15-in. vit. clay or conc. sew. pipe, sealed joints	1,250 l. f.	1.24	1.18	1.25
10. 18-in. vit. clay or conc. sew. pipe, sealed joints	1,350 l. f.	1.78	1.60	1.75
11. 21-in. vit. clay or conc. sew. pipe, sealed joints	700 l. f.	2.30	2.10	2.10
12. 24-in. r. c. sew. pipe, sealed and half-sealed jts.	850 l. f.	2.92	2.60	2.75
13. 30-in. r. c. sew. pipe, sealed and half-sealed jts.	25 l. f.	3.90	3.50	4.50
14. 36-in. r. c. sew. pipe, sealed and half-sealed jts.	250 l. f.	5.20	5.00	6.50
15. 12-in. rein. conc. culv. pipe, sealed joints	1,550 l. f.	1.30	1.15	1.40
16. 15-in. rein. conc. culv. pipe, sealed joints	350 l. f.	1.58	1.55	1.75
17. 18-in. rein. conc. culv. pipe, sealed joints	400 l. f.	2.22	1.90	2.75
18. 24-in. rein. conc. culv. pipe, sealed joints	800 l. f.	3.04	2.75	3.25
19. 30-in. rein. conc. culv. pipe, sealed joints	200 l. f.	4.38	3.90	4.25
20. 12-in. porous. conc. pipe, sealed joints	1,850 l. f.	1.36	1.20	1.45
21. 15-in. porous. conc. pipe, sealed joints	150 l. f.	2.02	1.80	1.90
22. 18-in. porous. conc. pipe, sealed joints	200 l. f.	2.65	2.25	2.50
23. 21-in. porous. conc. pipe, sealed joints	850 l. f.	3.63	3.25	3.25
24. Excavation for drainage trenches	9,700 c. y.	1.50	1.65	1.75
25. Rock excav. for drainage trenches	2,000 c. y.	4.00	5.00	7.50
26. Sand backfill and grav. filter, drain. trenches	8,100 c. y.	3.10	3.65	2.50
27. Excavation, open drainage ditches	25 c. y.	2.00	2.20	1.00
28. Concrete inlets	92 ea.	31.00	55.00	65.00
29. Manholes, 6-ft. or less in depth	93 ea.	60.00	71.00	75.00
30. Extra depth manholes	131 l. f.	10.00	16.50	15.00
31. Castings	59,000 lb.	.09	.10	.10
32. 3-in. electrical duct	5,750 l. f.	.35	.80	.55

HIGHWAY, MICHIGAN

OWNER: Michigan State Highway Dept., Lansing.

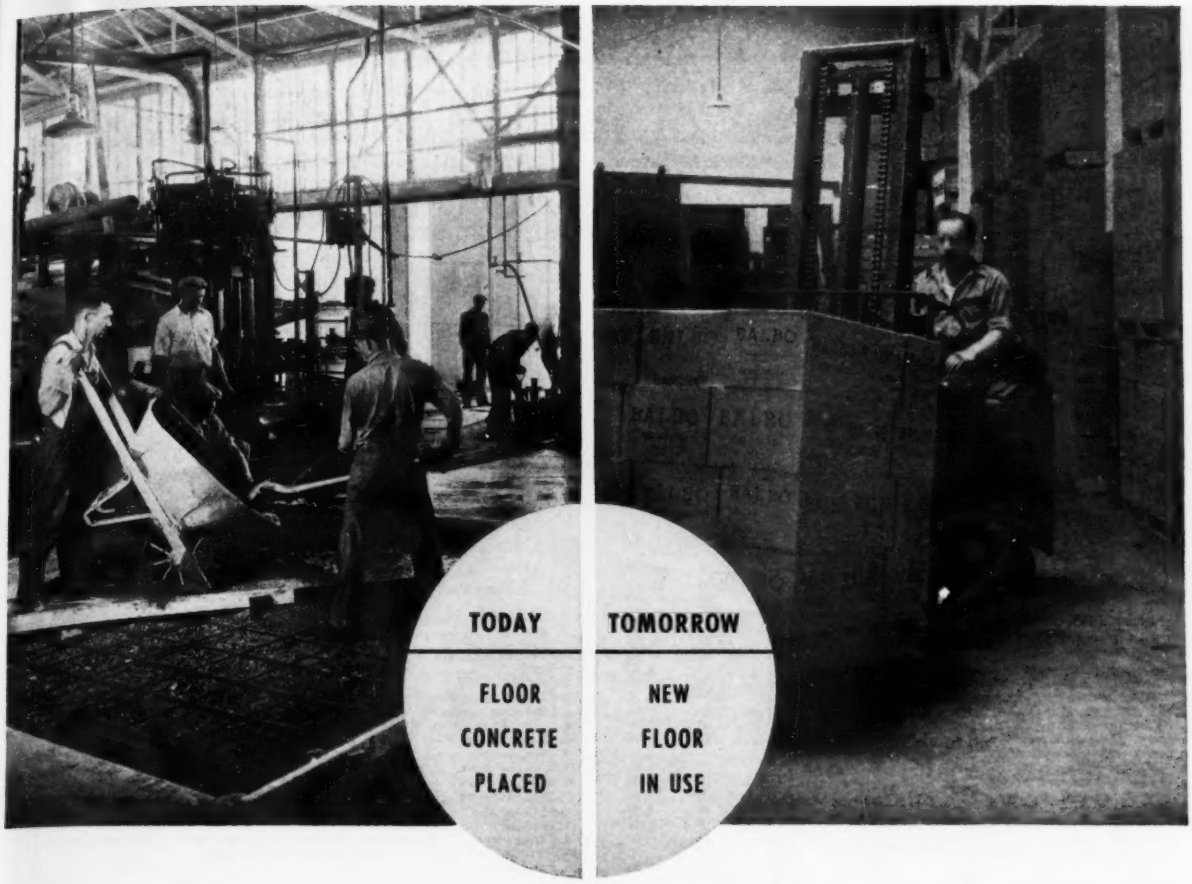
PROJECT: Construction of 1.460 miles of concrete pavement, Ecorse Road, State Route 17, in Washtenaw County, Mich. Includes necessary grading, drainage structures, and concrete pavement (9-in. uniform) in widths varying from 22-ft. to 55-ft.

CONDITIONS: Contractor to furnish all materials and complete work by September 1, 1942. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.62½ per hr.; semi-skilled, $1.37½; and common, 90c.

LIST OF BIDDERS: Bids opened April 22, 1942.

1. Bridgeport Core Sand Co., Saginaw, Mich. (contract) $513,023
2. L. A. Davidson, Lansing, Mich. 527,098

Item	Quan.	Unit Prices (1)	(2)
1. Clearing	12 ac.	$125.00	$130.00
2. Grubbing	332 s. rd.	1.25	1.00
3. Remove trees, 8 to 12-in. dia	15 ea.	15.00	15.00
4. Remove trees, 13 to 24-in. dia	7 ea.	20.00	20.00
5. Remove trees, 25 to 36-in. dia	4 ea.	30.00	40.00
6. Remove trees, 37-in. or more in dia	1 ea.	50.00	50.00
7. Remove old pavement	14,646 s. y.	.40	.50
8. Remove masonry and concrete	50 c. y.	5.00	10.00
9. Earth excavation	280,262 c. y.	.35	.40
10. Overhaul	465,516 sta. y.	.01	.01
11. Overhaul	205,668 yd. mi.	.12	.12
12. Trim and finish earth grade, 22-ft. pavement	16 sta.	10.00	10.00
13. As above, for 33-ft. pavement	110 sta.	15.00	15.00
14. As above, for 44-ft. pavement	32 sta.	18.00	20.00
15. As above, for 55-ft. pavement	8 sta.	20.00	30.00
16. 18-in. Class B culverts	844 l. f.	2.75	2.50
17. 24-in. Class B culverts	68 l. f.	4.00	5.00
18. 30-in. Class B culverts	394 l. f.	5.50	5.50
19. 12-in. sewer	1,453 l. f.	1.30	1.50
20. 15-in. sewer	130 l. f.	1.50	2.50
21. 18-in. sewer	210 l. f.	2.20	2.60
22. 12-in. sewer with open joints	1,817 l. f.	1.30	1.50
23. 15-in. sewer with open joints	130 l. f.	1.50	2.50
24. 6-in. edge drain sewer	6,000 l. f.	.45	.50
25. Manholes, type 1-A	9 ea.	110.00	100.00
26. Manholes, type 1-C	8 ea.	110.00	100.00
27. Catch basins, type 3-B	2 ea.	110.00	100.00
28. Catch basins, type 3-D	2 ea.	110.00	100.00
29. Inlets, type 5-C	55 ea.	105.00	60.00
30. Inlets, type 9-B	4 ea.	110.00	100.00
31. Plain riprap	55 c. y.	5.00	10.00
32. Fine grade and cleanup for 22-ft. pavmt	16 sta.	10.00	10.00
33. As above, 33-ft. pavement	110 sta.	15.00	15.00
34. As above, 44-ft. pavement	32 sta.	18.00	20.00
35. As above for 55-ft. pavement	8 sta.	20.00	30.00
36. Concrete pavement, 9-in. uniform	64,984 s. y.	2.55	2.30
37. Concrete roll curb	28,644 l. f.	1.00	1.00
38. Spec. conc. curb and gutter	1,320 l. f.	1.50	1.50
39. Aggregate approaches (loose meas.)	1,700 c. y.	2.00	2.00
40. Gravel shoulders 4-in. compacted	20,680 s. y.	.30	.25
41. Salvaged grav. should. 4-in. compact	8,100 s. y.	.22	.20
42. Topsoil surface (loose meas.)	5,553 c. y.	.40	.50
43. Bituminous approach mixture	150 ton	9.00	10.00
44. Guard posts	612 ea.	1.50	1.50
45. Sodding	33,250 s. y.	.28	.25
46. Maintaining traffic	L. S.	500.00	500.00
47. Bridges over pavement	2 ea.	150.00	100.00
48. Obliterating abandoned road	8 ac.	80.00	100.00
49. Emulsified carbon black	7,466 s.y. pavmt.	.25	1.00
50. Calcium chloride applied	11 ton	35.00	40.00
51. Clearing	9 ac.	125.00	130.00
52. Grubbing	1,376 s. rd.	1.10	1.00
53. Remove trees, 8 to 12-in. dia	6 ea.	15.00	15.00
54. Removing trees, 13 to 24-in. dia	5 ea.	20.00	20.00
55. Removing trees, 25 to 36-in. dia	3 ea.	30.00	40.00
56. Earth excavation	134,781 c. y.	.35	.40
57. Overhaul	14,770 sta. y.	.01	.01
58. Overhaul	101,999 yd. mi.	.12	.12
59. Trim and finish earth grade, 44-ft. pavement	29 sta.	15.00	20.00
60. 18-in. class B culvert	136 l. f.	2.75	2.50
61. 48-in. class B culvert	592 l. f.	10.00	15.00
62. 12-in. sewer	449 l. f.	1.30	1.50
63. Manhole, type 1-C	1 ea.	110.00	100.00
64. Inlet, type 5-C	16 ea.	105.00	60.00
65. Plain riprap	15 c. y.	5.00	10.00
66. Fine grading and cleanup for 44-ft. pavement	29 sta.	15.00	20.00
67. Conc. pavement, 9-in. uniform	15,878 s. y.	2.55	2.60
68. Concrete roll curb	5,730 l. f.	1.00	1.00
69. Gravel shoulders, 4-in., compacted	2,358 s. y.	.30	.25
70. Salvaged gravel shoulders, 4-in. comp.	4,000 s. y.	.22	.20
71. Topsoil surface (loose meas.)	2,457 c. y.	.40	.50
72. Guard posts	267 ea.	1.50	1.50
73. Sodding	11,936 s. y.	.28	.25
74. Emulsified Carbon black	2,195 s.y. pavmt.	.25	1.00
75. Removing old culvert (6-ft. box)	1 ea.	200.00	100.00



Use 'Incor' for Concrete Floors

...NON-DUSTING, DURABLE, HEAVY-DUTY SERVICE

PLACE 'Incor' concrete today . . . new floor in use in 24 hours. Save 5 or 6 days . . . no business tie-up. Stronger, denser, non-dusting concrete . . . because 'Incor', the improved Portland cement, cures *thoroughly* in a matter of hours instead of days.

Fifteen years' outstanding performance in heavy-duty floor service. Specify 'Incor'* 24-Hour Cement . . . made by the makers of Lone Star Cement, quality standard ever since 1900. Write nearest office for Floor Book. *Reg. U.S. Pat. Off.

Time Won't Wait . . . Use 'Incor'

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

HIGHWAY, WISCONSIN

OWNER: Wisconsin State Highway Commission, Madison.

PROJECT: Improving 4.39 miles of State Route 60 and U. S. Highway 12, west and north of Sauk City, Sauk County, Wis. Includes grading, and 20-ft. portland cement concrete pavement.

CONDITIONS: Contractor to furnish all materials and complete work in 100 working days. Rail and highway transportation facilities available. Wage rates are: skilled labor, 85c. to $1.50 per hr.; semi-skilled, 65c. to $1.50; and common, 65c. to $1.00. Roadway to relieve congestion of traffic caused by new plant in area.

BIDS: Four bids were opened April 17, 1942, ranging from the contract low of $177,423 to $210,812.

LIST OF BIDDERS:

1. Streu Construction Co., Two Rivers, Wis. (contract) $177,423
2. James Cape & Sons Co., Racine, Wis. 193,785
3. Koch Constr. Co., Milwaukee, Wis. 199,827
4. L. G. Arnold, Inc., Two Rivers, Wis. 210,812

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing	72 sta.	$5.00	$22.00	$25.00
2. Grubbing	70 sta.	5.00	22.00	25.00
3. Remove conc. pavement	4,483 s.y.	.25	.40	.30
4. Remove curb and gutter	590 l.f.	.25	.15	.20
5. Remove conc. sidewalks	84 s.y.	.30	.50	.20
6. Remove inlets	4 ea.	15.00	25.00	10.00
7. Unclassified excavation	85,670 c.y.	.26	.39	.30
8. Excavation for structures	180 c.y.	1.00	1.50	2.00
9. Finishing roadway	263 sta.	10.00	16.00	12.00
10. Concrete pavement	43,429 s.y.	2.10	2.10	2.38
11. Widening concrete pavmt.	1,718 s.y.	2.35	2.35	2.55
12. Concrete headers	11 s.y.	3.00	4.00	3.80
13. Gravel or crushed stone surf. crse.	7,469 c.y.	1.20	1.25	1.35
14. Aggr. for gravel or cr. stone traffic bound surf. crse (stockpiles)	870 c.y.	1.20	1.15	1.25
15. Salvage surface, base course	52,366 s.y.	.07	.09	.10
16. Concrete masonry, culverts	108 c.y.	22.00	26.00	25.00
17. Dry rubble masonry	301 c.y.	10.00	8.00	4.00
18. Rein. conc. culvert pipe, 24-in.	505 l.f.	3.35	3.40	3.35
19. Rein. conc. culvert pipe, 36-in.	94 l.f.	5.65	6.05	6.00
20. Rein. conc. culvert pipe, 42-in.	132 l.f.	7.00	8.00	7.50
21. Rein. conc. culvert pipe, 48-in.	85 l.f.	8.25	9.60	10.00
22. Temporary crossing (Sta. 47 + 94)	L.S.	300.00	200.00	200.00
23. Temporary crossing (Sta. 135 + 29)	L.S.	300.00	200.00	200.00
24. Temporary crossing (Sta. 176 + 44)	L.S.	300.00	200.00	200.00
25. Grouted rubble paving	35 s.y.	1.90	3.00	4.50
26. Rein. conc. culv. pipe, storm sew., 12-in.	113 l.f.	1.75	2.50	2.50
27. Catch basin, type A	1 ea.	175.00	250.00	150.00
28. Catch basin, type B	1 ea.	40.00	85.00	100.00
29. Inlets, type A	3 ea.	40.00	50.00	60.00
30. Inlets, type B	1 ea.	25.00	40.00	45.00
31. Manhole cover	1 ea.	20.00	45.00	25.00
32. Adjust manhole cover	10 ea.	20.00	15.00	15.00
33. Conc. combin. curb and gutter, 30-in.	590 l.f.	1.00	1.20	1.25
34. Conc. sidewalks, 5-in.	490 s.f.	.22	.25	.40
35. Marker posts	46 ea.	2.00	2.50	3.00
36. Marker posts, rt.-of-way	98 ea.	2.00	2.50	3.00
37. Topsoil seedbeds, sod	3,293 s.y.	.09	.09	.10
38. Salvage topsoil	43,000 s.y.	.10	.06	.10
39. Fertilizer	389 cwt.	2.75	3.50	4.00
40. Seeding	212,190 s.y.	.015	.012	.008
41. Sodding	3,293 s.y.	.40	.50	.35
42. Intercept. embankment	900 l.f.	.40	.15	.15
43. 18-in. culvert pipe	1,020 l.f.	1.60	1.80	1.50
44. 24-in. culvert pipe	40 l.f.	2.25	2.80	2.65
45. 30-in. culvert pipe	56 l.f.	2.70	3.50	3.25
46. 36-in. culvert pipe	40 l.f.	3.20	4.85	5.50
47. Scale resisting concrete pavmt.	8,019 s.y.	2.10	2.15	2.38

EL MONTE PIPELINE SAN DIEGO, CALIF.

OWNER: Federal Works Agency, Los Angeles, and City of San Diego, Calif.

PROJECT: Construction of El Monte pipeline (Unit 8) for supplying water to San Diego, Calif. Length approximates 50,000-feet, running from two miles east of Lakeside to point about 7½ miles west of Lakeside. Alternates were allowed for reinforced concrete steel cylinder pipe, electric welded steel pipe, or cast iron bell and spigot pipe. Contract awarded on former. Pipe thickness 48-in.; wall thickness 5½-in.; cylinder thickness, 10-gage.

CONDITIONS: Contractor to furnish all materials except valves and meters (Venturi meter and cone valves provided in contract as shown in bid tabulation below) and complete work in 180 calendar days. Highway transportation facilities available. Difficulty in securing satisfactory help may increase costs. Wage rates are: skilled labor, $1.10 to $1.50 per hr.; semi-skilled, $1.00; and common, 80c.

BIDS: Only one bid was received on each of the reinforced concrete steel cylinder pipe and the electric welded steel cylinder pipe alternates; none on cast iron. Bids opened May 12, 1942. Contract awarded May 19, 1942.

Venturi Meter—Control and Miscellaneous Valves

LIST OF BIDDERS:

1. American Pipe & Constr. Co., South Gate, Calif. (contract) $28,793

Item	Quan.	Unit Price (1)
1. 30-in. needle valve for throttling service, 48-in. pipeline, static head 350-ft	1 ea.	$10,575.00
2. 30-in. cone valve, for same (alternate)	1 ea.	5,800.00
3. 30-in. needle valve for shut-off service, 48-in. pipeline, static head 400-ft	3 ea.	8,250.00
4. 30-in. cone valve, for same (alternate)	3 ea.	6,100.00
5. Venturi meter	1 ea.	3,950.00
6. 6-in. vertical flanged gate valves	11 ea.	67.50

NOTE: Needle valves and cone valves are alternates. Bid figured on cone valves.

Reinforced Concrete Steel Cylinder Pipe—Schedule I

LIST OF BIDDERS:

1. American Pipe & Constr. Co., South Gate, Calif. (contract) $1,195,062

Item	Quan.	Unit Price (1)
1. Excavation, Class 1	114,500 c.y.	$1.44
2. Backfill	84,175 c.y.	.60
3. Sand for backfill	15,000 c.y.	1.50
4. Excavation and backfill	120 c.y.	4.50
5 Excavation and backfill, Class 3	200 c.y.	4.50
6. 48-in. I.D. rein. conc. steel cylinder pipe	2,700 l.f.	17.25
7. 48-in., as above	3,210 l.f.	17.65
8. 48-in., as above	3,700 l.f.	18.10
9. 48-in., as above	7,620 l.f.	18.55
10. 48-in., as above	7,630 l.f.	18.90
11. 48-in., as above	7,100 l.f.	19.35
12. 48-in., as above	13,300 l.f.	19.80
13. 48-in., as above	3,800 l.f.	20.20
14. Furn. and install I.D. rein. conc. 10-ga. steel cylinder pipe	255 l.f.	13.10
15. Furn. and inst. 30-in. 3/16-in. plate elec. welded steel pipe	20 l.f.	25.00
16. Furn. and inst. 30-in. 1/4-in. as above	40 l.f.	30.00
17. Load, haul, install 30-in. horizontal bevel geared hub end control valve for throttling service	1 ea.	150.00
18. Load, haul, install 30-in. horiz. bevel geared hub end control valve	3 ea.	150.00
19. Load, haul, install Venturi meter	1 ea.	200.00
20. Furn. and inst. 6-in. blow-off valve assemblies	11 ea.	175.00
21. Furn. and inst. 4-in. comb. pressure air-vacuum valve assemblies	14 ea.	250.00
22. Concrete in piers, anchor blocks	20 c.y.	30.00
23. Renforced concrete in valve chamber	40 c.y.	45.00
24. Break and replace concrete pavement	1,900 s.f.	.70
25. Break and replace oiled surface pavement	25,000 s.f.	.15
26. Cement in place in work (Items 22, 23 and 24)	146 bbl.	2.50
27. Reinf. steel in place in work (Items 22 and 23)	7,000 lb.	.10
28. Furn. and install 18-in. access manholes, c. i. covers	10 ea.	150.00
29. Furn., inst. 22-in. city std. c.i. manhole frame and covers	14 ea.	25.00
30. Furn. and inst. complete centrif.-spun rein. conc. pipe, 1,000-D load	30 l.f.	4.25
31. Field office	1 ea.	425.00
32. Project signs	4 ea.	70.00

Electric Welded Steel Pipe—Schedule II

LIST OF BIDDERS:

1. Macco Construction Co., Clearwater, Calif. $1,378,369

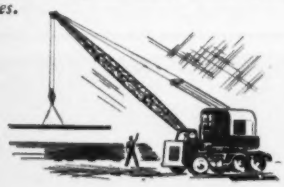
Item	Quan.	Unit Price (1)
1. Excavation, Class 1	99,130 c.y.	$1.20
2. Backfill	75,100 c.y.	.50
3. Sand backfill	15,000 c.y.	.60
4. Excavation and backfill, Class 2	120 c.y.	5.00
5. Excavation and backfill, Class 3	100 c.y.	5.00
6. 48-in. I.D. 3/16-in. plate, elec. welded steel pipe	24,774 l.f.	22.00
7. 48-in., 1/4-in., as above	24,260 l.f.	25.00
8. 36-in., 5/16-in., as above	255 l.f.	20.00
9. 30-in., 3/16-in., as above	20 l.f.	18.00
10. 30-in., 1/4-in., as above	40 l.f.	20.00
11. Load, haul, install 30-in. horiz. bevel geared hub end control valve for throttling service	1 ea.	5,000.00
12. Load, haul, install 30-in. horiz. bev. geared hub end control valve	3 ea.	8,500.00
13. Load, haul, install Venturi meter	1 ea.	5,000.00
14. 6-in. blow-off valve assemblies	11 ea.	250.00
15. 4-in. comb. pressure air-vacuum valve assemblies	14 ea.	300.00
16. Conc. in piers and anchor blocks	20 c.y.	20.00
17. Rein. conc. in valve chambers	40 c.y.	30.00
18. Break and replace conc. pavement	1,900 s.f.	.30
19. Break and replace oiled surf. pavement	25,000 s.f.	.20
20. Cement in place in work (Items 16, 17 and 18)	146 bbl.	2.50
21. Rein. steel in place in work (Items 16 and 17)	7,000 lb.	.10
22. 18-in. access manholes with cast iron covers	10 ea.	200.00
23. 22-in. city standard cast iron manhole frames and covers	14 ea.	50.00
24. 30-in. centrif.-spun rein. conc. pipe, 1,000-D load	30 l.f.	7.00
25. Field office	1 ea.	300.00
26. Project signs	4 ea.	20.00

"It's up to his skilled hands to get every hour of extra rope service we put in . . .

Here are some helpful tips you can pass along . . . things that mean even longer life for Roebling "Blue Center" Steel Wire Rope . . . steel saved for U. S. at War!

Lesson One:—take a piece of string and pull it gently . . . you'll find it will stand an unusual strain before breaking. But snap the same string quickly and it's easily broken.

Same thing applies to a wire rope. In any kind of hoisting operation, it's vital that the rope should have no slack at the beginning of the lift—else the load might be applied suddenly and then the impact on the rope will be greatly in excess of weight of the load being handled. So *don't jerk your ropes.*

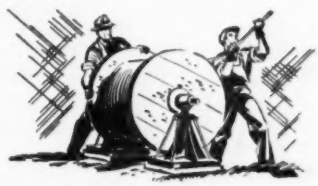


Lesson Two:—a hammer weighing only a few pounds can produce a blow having the force of a couple of tons. The load on a wire rope is like a hammer—striking a blow on the rope whenever you start the load too quickly. Even without slack, the rope gets a tremendous impact when power is applied too fast—as in the case, for instance, when the operator of a shovel moving a boulder tries to knock it out of the way instead of easing it out.

And it's the same when the rope is going the other way. When even a light load is stopped suddenly while being lowered, the rope is subjected to a much greater strain than the equipment could ever apply to it in hoisting. So *don't jolt your loads.* Brakes should be applied smoothly and uniformly, and at the slightest sign of "grab" should be eased off. Brake your load over a longer period and your rope will last over a longer period.

In general, shock loads will remove from the rope the very elasticity that is put in to absorb normal impact, while careful handling will preserve the rope's elasticity and keep it in condition to deliver long life. Of course, the way a machine is run always affects its general maintenance. It's a well-known fact that some people are harder on machinery than others. An operator can push a machine (and a rope) just so far to get extra work out of it—beyond that, the punishment takes its toll of both the machine and the rope—and breakage begins to cost more than the extra work is worth. But in these days when rope steel is vital to the war effort, *wire rope must not be abused.*

Lesson Three:—a pitch-fork was not made to shovel sand. Likewise, "borrowing" ropes is very seldom practical. In these times of priorities and shortages, some operators have been "borrowing" ropes from one operation and installing them on another.



Before you "borrow" a rope, make a careful analysis to see whether you won't get better ultimate economy out of putting the right new rope on the equipment that needs it, and taking the necessary steps to preserve the used rope and make it last on the job it's now doing.

Roebling "Blue Center" Steel Wire Rope is made to deliver a long lifetime of service—it has built a reputation for just that, wherever wire rope has a routine or unusual job to do."

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

More ways to help you conserve wire rope coming in this space next month.

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

IT *MUST* WORK OR ELSE ~ ~ ~

Because a parachute must be ready *all the time* for an emergency, it has to be made *right*. The same is true of valves . . . especially those located in strategic power plants and production centers.

Ludlow Valves are always ready for emergencies. Throughout American industry, thousands of these rugged valves—many installed years ago—are now meeting the most severe tests, successfully! Operating on the famous double-disc, parallel seat principle, developed and perfected by Ludlow, these sturdy valves work smoothly, close securely—whether in action almost continuously or only on rare occasions. In peace or war, *Ludlow means value in valves*. Send for catalog.

THE LUDLOW VALVE MFG. CO., INC.
TROY, NEW YORK

Construction Features: **Self-releasing 30° angle wedges and free-floating gates, self-adjusting to seats, afford smooth, trouble-free performance, long service. Rings are cleaned throughout stroke action. Gates are wedge-locked directly opposite ports and completely unwedged before raising. Ample tolerances provide easy action. Simple construction permits easy replacement of parts.**

LUDLOW VALVES

SINCE 1866

New Aids to the Constructor

Equipment and material announcements and manufacturers' news

Tool Stands

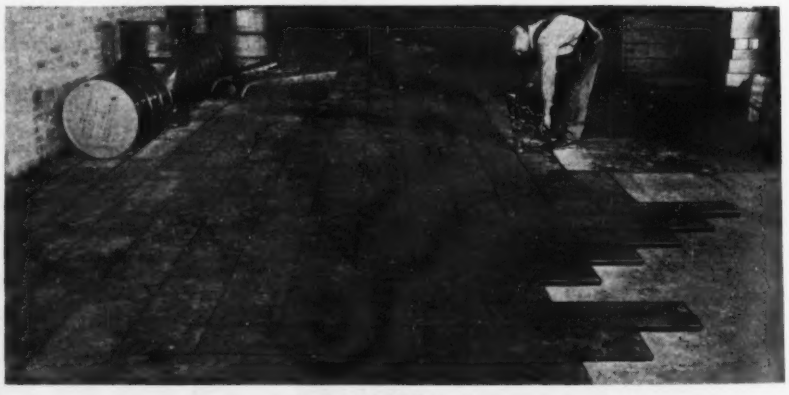
New tool stands recently announced by Lyon Metal Products Co. look very handy for efficient and individual storage of tools for workers on one, two, or three shift operations. The stands are useful around production machines and toolrooms as toters up to the job; for assembly lines, parts and tool transporters for maintenance men, equipment carriers for inspectors and for stock picking and transportation. Drawers can be locked to guard against thieving and the drawers feature easy sliding and flat key locks.—*Lyon Metal Products, Inc., 3213 Clark St., Aurora, Ill.*

Alloy Steels

Joseph T. Ryerson & Son, Inc., have announced the addition of the new NE alloy steels to their warehouse stocks. NE alloys are the new "lean" alloy steels established by the metallurgical staff of the War Production Board to help conserve nickel, chromium, vanadium, etc. for the duration. To make these new alloys quickly available, Ryerson has planned a representative stock of hot rolled rounds in sizes ranging from ½ to 7 in. in diameter and in six different analyses. Heretofore, these new steels have not been available for experimentation and it has been difficult to secure even small lots. New manufacturers can get small lots for treating and testing in specific applications.—*Joseph T. Ryerson & Son, Inc., Chicago, Ill.*

Chemical change colors concrete

The developers of the Hunt Process and Ritecure now offer the Johnson-March concrete camouflage, unlike a paint, that produces color in the concrete itself by a chemical reaction. The material used is a water soluble, concentrated compound that gives its color through reaction with the concrete instead of forming a coating and gives a soft, nonreflecting finish, in which the texture of the concrete surface remains unchanged. The material is supplied as a dry powder concentrate to be mixed with water before using. The compounds mix easily, stay in suspension without stirring during the



Industrial Flooring

An asphalt plank flooring has been developed for industrial plants that is said to meet the important requirement of being resilient, durable, acid-resisting and waterproof. Composed of asphaltic materials, this plank flooring arrives on the job in convenient sized planks of required widths, lengths and thicknesses. The flooring is also said to be appropriate for loading platforms, freight houses, storage plants, factories. Installation can be made without interruption of plant operation. — *Servicised Products Corp., 6051 W. 65th St., Chicago, Ill.*

application period, and can be applied by brushing or spraying. Since the concrete is chemically dyed, not painted, the concrete itself must be worn away to remove the tint. The Johnson-March Concrete Camouflage is available in two distinctive, basic colors, dark green that simulates grass, cultivated fields and foliage; and a dark brown for use where the surrounding terrain is sandy or rocky with sparse vegetation.

The material can be applied to existing concrete surfaces as well as to freshly laid concrete. The procedure on the new concrete is to spray it on the surface immediately after the finishing process is complete, and then cover the surface with Ritecure to prevent surface drying. —*The Johnson-March Corp., 52 Vanderbilt Ave., New York City.*

Ceramic Grease Traps

New style grease traps manufactured by the J. A. Zurn Mfg. Co. use a newly developed vitreous glazed earthenware interceptor, to replace the former cast iron unit. The Greaseptor is said to be better than 90 percent efficient at the rated capacity of 25 g.p.m. It utilizes the same basic flotation principle of grease interception that has always been identified as a distinguishing feature of Zurn Greaseptors. Approximately 90 percent of the interior of the interceptor is available for the function of grease interception—a ratio said to be unusually high for this type of device.—*J. A. Zurn Mfg. Co., Erie, Pa.*

Corrosion Inhibitor

The D. W. Haering & Co., Inc., Research Laboratories have announced development of a new corrosion inhibitor identified as ferri chrom glucosate. This new inhibitor is the ferric salt of quachrom glucosate and introduces a non-oxidizing chromium inhibitor for the first time. The product controls corrosion in some applications in concentrations as low as two parts per million and may be employed in reducing equilibria at low

SMALL GASOLINE MOTORS HELP MAINTAIN
Vital
COMMUNICATION LINES!
On the front lines, as well as behind the front, our country's war program depends a great deal on constantly keeping communications open. Here again, as in many other branches of military and civilian service, Briggs & Stratton 4-cycle, air-cooled gasoline motors ranging from 2/3 to 6 HP, play a vital role, furnishing dependable power for many uses.
Today, all the manpower and the production facilities of the Briggs & Stratton organization are devoted to the war program.
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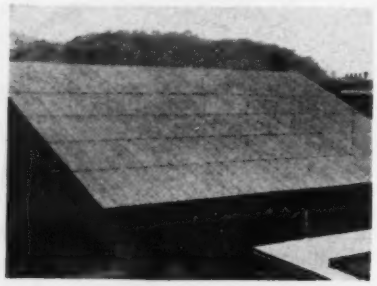
pH values for corrosion control. The product may be applied by dipping or spraying, or may be incorporated in paints or lubricants for corrosion control. —*D. W. Haering & Co., Inc., 205 W. Wacker Drive, Chicago, Ill.*



Weatherproofing Metals

An improved method of weatherproofing prefabricated metals and shapes has been introduced by the Coated Products Corp. This process, utilizing "Plastipitch," is said to replace galvanizing, and rolled bituminous applications for weatherproofing and protecting metals against corrosive atmospheric conditions. It thus releases zinc ordinarily used for galvanizing. "Plastipitch" is a pitch of improved plastic characteristics, used in a simple bonding process to weatherproof completely all types of metals of all sizes, shapes, forms or gages. An outstanding characteristic claimed for the process is its ability to provide special climatic or weather resistant qualities as may be required to meet arctic or subtropic conditions. This is accomplished by appropriately modifying the "Plastipitch" before application to the metal to produce a coating that will not become brittle or chip off at low temperatures, or melt and flow at high atmospheric temperature.—*Coated Products Corp., P. O. Box L, Verona, Pa.*

Surfacing

A preventive against leaks, hydrostatic pressure, and many other problems in concrete building, is the product known as "Flextite," produced by the Flexrock Co. The product is recommended for stopping leaks through foundation walls, for protecting surfaces subject to intense heat and cold, for patching, and for many other uses.—*The Flexrock Co., 2300 Manning St., Philadelphia, Pa.*

Electrode

An all-position, high-quality alternating-current electrode, type W-26, extending the advantages and convenience of high quality a-c welding to both vertical and overhead positions, has been announced by the General Electric Co. Alternating current arc welding The W-26 electrode, developed after intensive research, fulfills a long felt need for vertical and overhead a-c welding, electrode that would give a high quality job from the standpoint of physical characteristics, as well as easy operation, adequate penetration, and practically flat fillet contour.—*General Electric Co., Schenectady, N. Y.*

Intrusion Protection

Photoswitch, Inc. has announced an addition to its line of photo-electric protective systems, Type A28L control for outdoor and indoor use over very long ranges. The light source projects a practically invisible light beam for distances of 350 to 700 ft., and it is possible to completely surround power plants, defense factories and other vital areas. If the light beam is broken, the photoelectric control contacts close, thereby sounding alarms, operating a central station system, turning on floodlights, closing gates or other adjustments. The attachment is unaffected by changes in local light, and is designed to operate 24 hours a day.—*Photoswitch Inc., 21 Chestnut St., Cambridge, Mass.*

Skin Protection

A new product called "Man-O", a bland skin protective cream for active hands which serves as a guard against skin irritants has been announced by the Sabern Products Company. The cream is rubbed into the hand, the portion of the arm exposed, around the finger joints, and under the nails before the worker starts his shift. Man-O forms a film-like,

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Hartford — The Holmes-Talcott Company
GEORGIA
Atlanta — Tractor & Machinery Co., Inc.
IDAHO — Twin Falls — Nelson Equipment Co.
ILLINOIS — Chicago — Kennedy-Cochran Co.
Rock Island — Western Equipment & Supply Co.
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Indianapolis — Reid-Holcomb Company
IOWA — Des Moines — Electrical Eng. & Constr. Co.
KENTUCKY — Harlan — Hall Equipment Sales
Louisville — Engineering Sales Company
LOUISIANA
New Orleans — Wm. F. Surgi Equipment Company
MAINE — Ellsworth — Murray Machinery Co.
MARYLAND
Baltimore — D. C. Elphinstone, Inc.
MASSACHUSETTS
Boston — P. I. Perkins Company
Cambridge — W. W. Field & Son, Inc.
MICHIGAN
Detroit — W. H. Anderson Company, Inc.
MINNESOTA
Minneapolis — The George T. Ryan Company
MISSOURI
Kansas City — Machinery & Supplies Company
St. Louis — Webster & Hedgcock Tr. & Eq. Co.
MONTANA — Helena — Caird Engineering Works
NEBRASKA
Lincoln — Highway Equipment & Supply Co.
NEW JERSEY
Irvington — Smith Tractor & Equip. Co., Inc.
NEW MEXICO
Albuquerque — The Harry Cornelius Company
NEW YORK
Albany — Larkin Equipment Company
Binghamton — MacDougall Equipment Co.
Buffalo — Dow & Company, Inc.
Glens Falls — Colin, Fox Co., Inc.
Middleton — S. T. Randall, Inc.
New York — Hubbard & Floyd, Inc.
New York — Morris Park Construction Co.
Olean — Freeborn Equipment Company
Oneonta — L. P. Butts, Inc.
Syracuse — Harrod Equipment Company
Troy — Briggs Machinery Company, Inc.
NORTH CAROLINA
Durham — Constructors Supply Company, Inc.
OHIO — Cincinnati — Finn Equipment Company
Cleveland — Gibson-Stewart Company
Marietta — Northwest Supply & Equipment Co.
Toledo — M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City — Townsco Equipment Co.
OREGON
Portland — Andrews Equipment Service
PENNSYLVANIA
Easton — Sears & Bowers
Harrisburg — N. A. Coulter
Oil City — Freeborn Equipment Company
Philadelphia — Metalweld, Inc.
Pittsburgh — John McC. Latimer Company
Wilkes-Barre — Ensminger & Company
SOUTH CAROLINA
Columbia — Bell-Lott Road Machinery Co.
TENNESSEE
Chattanooga — James Supply Company
Knoxville — Wilson-Weesner-Wilkinson Co.
Memphis — Tri-State Equipment Company
TEXAS — Dallas — Shaw Equipment Company
Houston — McCall Tractor & Equipment Co.
San Antonio — Patten Machinery Company
UTAH
Salt Lake City — James A. Wade Company
VIRGINIA
Richmond — Highway Machinery & Supply Co.
WASHINGTON
Seattle — Star Machinery Company
Spokane — General Machinery Company
WEST VIRGINIA
Fairmont — Interstate Engineers & Constructors
WISCONSIN
Eau Claire — Bradford Machinery Company
Green Bay — Nelson Machinery Company
Madison — Western Equipment Company
WYOMING
Cheyenne — Wilson Equipment & Supply Co.

Get more WORTH from air with WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

invisible and flexible glove, protecting the skin from absorbing grease, cutting oils, paint, gasoline, and other matters difficult to clean off. The manufacturer claims that Man-O can also be used effectively as a guard against occupational skin irritations. It washes off easily with soap and water, taking all dirt with it.—*The Sabern Products Company, Cleveland, Ohio.*

Degreasing Solvent

The Curran Corporation has received a patent for a new use for Gunk, a self-emulsifying degreasing solvent now widely distributed to airmotive and automotive markets. The new Gunk emulsion product is described as an oil having "Polar" characteristics, it will quickly lubricate and preserve wet metal surfaces from rust. The new oil is said to be especially valuable for treating metal surfaces which have been wet with salt water and require cleaning, lubricating and a preservative treatment.—*The Curran Corporation, Dowling Building, Malden, Mass.*

OXYGEN is vital..
DON'T WASTE IT
Turn off torches when laying out work.
Do not use wasteful pressures or oversize tips.
Check hose and connections regularly for leaks.
Use all the gas in each cylinder before connecting a new one.
Close cylinder valves when not in use.
Keep tips clean.
Be sure equipment is in good working order.
Help your pals in the Armed Services
FIGHT WASTE

Campaign Against Waste

As part of a campaign against waste of oxygen in welding and cutting operations, two posters for display in plants where oxyacetylene processes are used have been made available. The posters dramatize oxygen's importance to war production and emphasize the need for its conseravtion. Eye-catching colors and illustrations give both pieces high attention value. No advertising appears on either poster.—*G. Van Alstyne, Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.*

Most producers of oxygen and acetylene, in common with other manufacturers who use returnable containers, also are finding it necessary to expend more than the usual effort to accelerate

ARTERIES for PRODUCTION'S
"LIFEBLOOD"
made to order—fast!

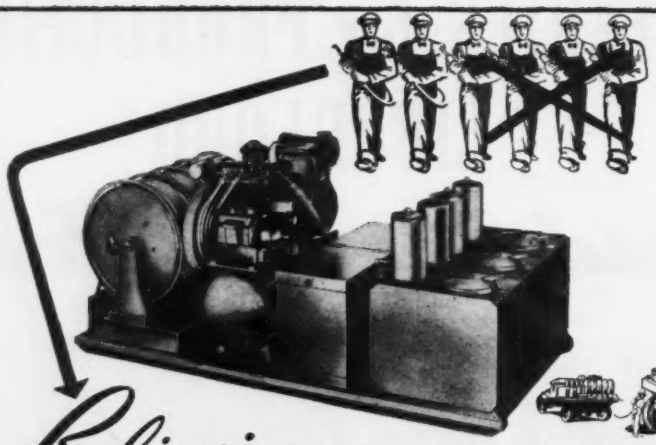
GRINNELL provides the means for converting a *pile* of pipe into a piping *system* . . . a vital artery to furnish Power . . . Fire Protection . . . Heat . . . Fuel . . . Air . . . Water . . . Humidification in a plant, a ship, a tank or a plane.

Taking the OFFENSIVE against delays in production, Grinnell has stepped up its facilities to handle all requirements "whenever piping is involved" – *faster.* Included are pipe prefabrication for power and process lines, automatic sprinkler fire protection, cast and malleable iron fittings, pipe hangers for every condition, welding fittings, heating specialties and humidification systems. Grinnell Co., Inc., Executive Offices, Providence, R. I. Branch offices in principal cities of U. S. and Canada.

Don't let delays occur – call upon GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc. • *Grinnell Company of the Pacific* • *Grinnell Company of Canada, Ltd.*
General Fire Extinguisher Company • *American Moistening Company*
Columbia Malleable Castings Corporation • *The Ontario Malleable Iron Company, Ltd.*



Relieving THE LABOR SHORTAGE

Yes sir, one Graco Convoy Luber for lubricating trucks, tractors, and all kinds of construction equipment ON THE JOB will release four out of six lubrication men (using hand methods) for other work . . . and do a better lubrication job in less time.

More vitally important than that, your entire equipment investment is protected by more thorough, more complete, and more positive lubrication.

Graco Convoy Lubers are completely assembled at the factory and shipped to you ready to operate. All necessary adapters and accessories are included. Various models are available dispensing grease from tanks (as in Model LU-100 illustrated) or from original lubricant containers.

There is a Graco representative or distributor near you. Write or wire today for information.

GRACO

GRAY COMPANY, INC.

Minneapolis, Minn.

the return of these containers. The Linde Air Products Co., among others, for several months has been carrying on an active program to stimulate cylinder turnover. The program has included the distribution of posters like the above for display in plants.—*The Linde Air Products Co., 30 East 42nd St., New York, N. Y.*

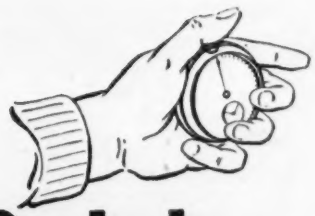
Concrete Vibrators

Six concrete vibrators of a new type have been put in service at Shasta Dam. Designed and built by G. L. Malan, formerly master mechanic for Pacific Constructors, Inc., the vibrators are operated by compressed air and have no bearings, no governor and no valves. The only moving part is the steel rotor. These machines are said to do the same work as the largest concrete vibrators previously made, but weigh less than half as much (55 lb. as compared to 119 lb.). The order for the six machines was placed after one machine of this type had been in service at Shasta Dam for eight months, during which time it had not been taken apart for repairs or adjustment.—*G. L. Malan, 1526 West Burnett St., Long Beach, Calif.*

Preventing Corrosion

A new product, Micromet, designed to prevent scale, eliminate "red water" and control corrosion in household water systems, air conditioning units and mechanical washing equipment, has been introduced by Calgon, Inc. Micromet is a glassy sodium phosphate, made of food-grade material to a closely controlled composition, and carefully crushed and sized. When placed in cold water it dissolves at the rate of 25 percent per month. Micromet is fed into the raw

Every extra pay yard gained — every minute you can save to speed completion of your present job enables you to release your equipment just that much sooner for work on other Victory projects



Get Bigger Loads Quicker

with Your Present Equipment...for Victory

Load LeTourneau Carryalls and Tournapulls Downhill; Use "Wrinkle" Loading Method; Break up Hard Cuts with Rooters.

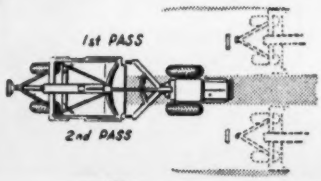
See how these job-proved methods enable you to get bigger loads and more of them quicker with tractor-drawn LeTourneau Carryall Scrapers and with Tournapulls:

LOAD DOWNHILL

Loading downhill, wherever possible, offers you many advantages . . . creates greater drawbar pull when using older, less-powerful tractors . . . gives practically same help as pusher loading when pusher tractors are not available. In any case, you get bigger Scraper loads quicker.

TRY THIS NEW LOADING "WRINKLE"

Many smart contractors shorten loading time by using the "wrinkle method". Here's how it works: make the first two Scraper cuts 4 or 5 feet apart. This loosens the dirt between. Then, on the third cut load down between the first two passes, picking up the ridge, or "wrinkle" of loosened material. Results: faster, easier loading. Try this job-tested method on your job. The accompanying diagram shows you how.



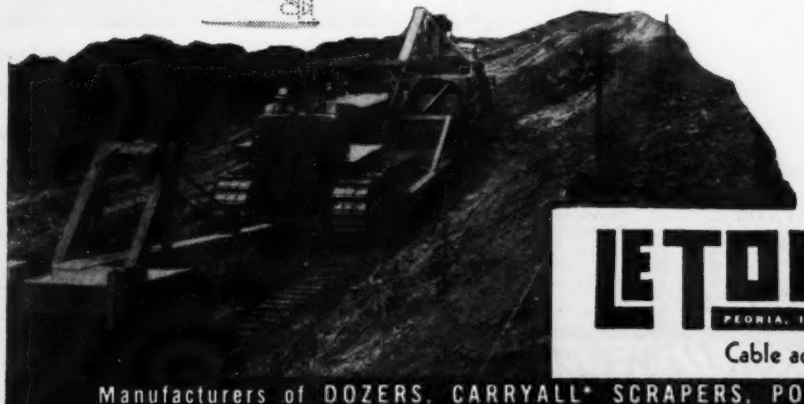
Down-grade pusher loading reflects smart job planning on this highway construction, near Santa Cruz, California. Rooter further added to the pusher tractor's usefulness, kept the cut loosened, thus enabled the Super C Tournapulls and 15-yard (heaped) LP Carryalls to get bigger loads quicker. N. M. Ball is the contractor.

ROOT TOUGH MATERIALS

LeTourneau Rooters increase the materials your Scrapers and Tournapulls can profitably handle, by making easy-to-handle scraper dirt of all tough materials, save solid rock . . . same time, eliminate blasting. Again, you increase the yardage you can handle . . . and reduce tire wear and Tournapull and Scraper maintenance. By hooking a rooter to your pusher tractor, for Rooting between loads, you can help solve your own tractor shortage problem.

ANOTHER TIME-SAVER— DEALER SERVICE

Your local LeTourneau-"Caterpillar" dealer can furnish you with many more job-planning ideas for getting maximum yardage and lowest costs with LeTourneau equipment. He also has parts and factory-trained servicemen to keep your equipment working at full efficiency for Victory. Make him your Victory Construction Headquarters. Call on him any time you need help on job planning or equipment service.



LeTourneau Heavy Duty Rooter in no way interferes with pusher loading . . . enabled pusher tractor to loosen this tough cut between Carryall loads on Hy. 49, near Jamestown, Calif. Contractor E. G. Keeble used three LeTourneau Carryalls and two Dozers.

LETOURNEAU

PEORIA, ILLINOIS . STOCKTON, CALIFORNIA

Cable address "Bobletorno"

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Name Reg. U. S. Pat. Off.

Design For Victory!

SIMPLIFIED REGULATION
and Wedge-Tight Shut-Off of Volume and Pressure

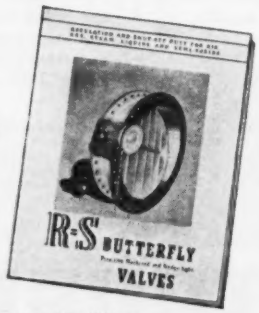
Materials for Victory start at the drafting board. Non-complicated designs that closely conform to simple principles such as the lever and the wheel are best.

Butterfly Valves have long been recognized as the ideal type for regulation. With the improved R-S design, they are now used with equal effectiveness for the *shut-off* of any medium that flows or is forced through a pipe. Manual or automatic operation in sizes to 84-inches and pressures to 300 lbs., for air, gas, water, chemicals, oil, steam and semi-solids.

There are innumerable applications for R-S Butterfly Valves in war industries, waterworks, flood control, irrigation and many other fields. Such installations increase regulation and shut-off efficiency while decreasing operating costs. Distributors in principal cities are valve specialists and will gladly furnish helpful information.

R-S PRODUCTS CORPORATION
116 Berkley St., Philadelphia, Pa.

The new R-S Catalog No. 10-B tells the complete story. Write for your copy.



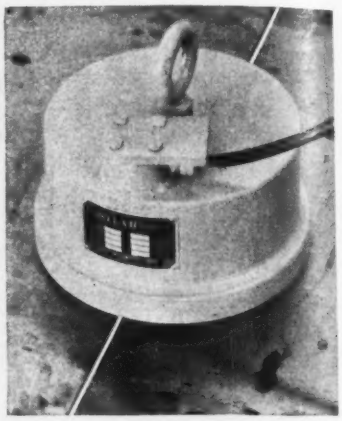
As illustrated above, the vane closes naturally against the body of the valve and at the correct angle for wedge-tight shut-off. Machined to exceptionally close tolerances. Substitute metals are available to meet any operating condition.

20" 125-lb. American Standard Valve, hand wheel control. Ball bearing mounted with stuffing box. Vibrationless vane is self-cleaning and extremely easy to operate.

Copyright 1942—
R-S Products Corporation, Phila.

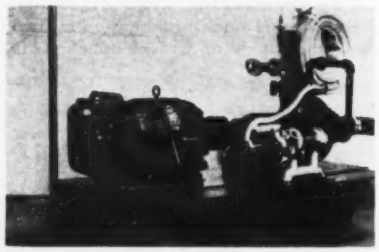
R-S Streamlined BUTTERFLY VALVES

water line by means of a simple pot-type feeder—individually made of standard galvanized or black iron pipe by the local plumber to conform to the requirements of individual systems.—*Calgon, Inc., Pittsburgh, Pa.*



Holding Magnet

A holding magnet or magnetic welding clamp has been designed by the Stearns Magnetic Mfg. Co. for numerous applications in such industries as shipbuilding and in many welding processes. The magnet is designed in various sizes, the one shown in the illustration being of 10 in. diameter and weighing about 70 lb., with a pull of 2,000 lb. on ¾ in. and 1 in. steel plates, and operable from 40 volts or 60 volts direct current. Terminal for energizing cable is well protected from shock and damage.—*Stearns Magnetic Mfg. Co., Milwaukee, Wis.*



Portable Pumping Unit

The Fairbanks Morse Co. has developed a portable pumping unit which may be adapted to a variety of service, municipal and otherwise. A good example of this type of unit was recently assembled for the city of Waverly, Ohio. A 2-in. non-clogging F-M sludge pump was directly connected to a 3 hp. F-M splash-proof motor and mounted on a standard warehouse truck with 8-in. rubber tired wheels. The pump is primed by means of a hand operated bracket-type pump mounted on a truck platform, with its suction connected to the top of the volute through a ¾-in. pipe

Keep 'Em Running!

To keep the enemy on the run, it is imperative that we keep our fighting forces supplied with all necessary equipment. Enormous quantities of steel are required for guns, planes, tanks, ships and shells. The more service you can get out of your wire ropes, the more steel you save for these other vital purposes. . . So, the longer you can keep your ropes running, the faster will be the flight of the foe.

Whether or not a wire rope gives the full service of which it is actually capable, depends largely upon the conditions under which it is required to work—unfavorable or improper conditions mean shorter life; to save steel, give your ropes the same kind of a chance you are now giving your tires.

For the benefit of all wire rope users we have published a 44 page illustrated booklet entitled, "Practical Information on the Use and Care of Wire Rope". It contains information that will help all wire rope users get more "work hours" from every pound of their wire rope steel. We shall be glad to supply a complimentary copy upon request.

Another important factor in getting maximum service from wire rope is the use of the correct grade, construction and type. On all problems of this kind, feel free to consult our experienced Engineering Department.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST LOUIS MISSOURI U.S.A.

HERCULES RED STRAND WIRE ROPE

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
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SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

U. S. Post Office, Augusta, Ga. Erected 1914. U. S. Treasury Dept., Oscar Wenderoth, Supervising Architect; supported on 372 MacArthur Uncased Compressed Concrete Piles.

FOR 32 YEARS

(when there was no METAL shortage)

Concrete Piles Have Been Preferred

From 1910 through '41, when priorities on metals did not exist, leading engineers and architects, utilities, railroads, industrials and municipalities, etc., selected MacArthur *Compressed Concrete* Piles for every type of structure. The performance of these piles proves the efficiency of the MacArthur Method which *eliminates* the use of steel casings except in rare instances. MacArthur drives *every* type of pile...uncased, cased, wood, pipe, pre-cast...so our engineers are unbiased. A mass of factual, attested data is available for the inspection of anyone not familiar with us, or our piles, or our reputation. That is down-to-the-ground talk ... that's where we work. If you have a foundation job that requires piles ... if you want it done thoroughly and *quickly* ..."Put it up to MacArthur".

CHECK YOUR REQUIREMENTS AGAINST MacARTHUR QUALIFICATIONS

PRODUCT	proven
EXPERIENCE	32 years
EQUIPMENT	latest
PERSONNEL	capable
CLIENTELE	illustrious
RESPONSIBILITY	demonstrated
ENGINEERING	sound
PERFORMANCE	100%
SPEED	record-breaking

MacARTHUR

CONCRETE PILE CORPORATION

18 East 48th Street, New York City

ESTABLISHED 1910

BOSTON: 6 Beacon St. • NEW ORLEANS: 823 Perdido St. • CINCINNATI: 1542 Shenandoah Ave.

We can help solve your problems on

SLUDGE • GUM VARNISH • RUST and CORROSION

in all types of engines and fuel tanks

SEND FOR ENGINEERING AND SERVICE DATA

PETROLEUM SOLVENTS CORPORATION

331 MADISON AVENUE, NEW YORK, N. Y.

Manufacturers of additives for motor oils and solvents for all types of petroleum residues

line equipped with a shut-off valve. The discharge hose is fitted with a gate valve to control the head under high suction lift conditions and to seal the discharge of the pump during priming operations. Such a unit may be used on construction projects, at any place where temporary drainage is necessary, and for any number of other tasks where a portable pump is required.—*Fairbanks-Morse & Co., 600 So. Michigan Ave., Chicago, Ill.*

18-Inch Searchlight

For use at industrial plants, public utilities, ordnance plants, and aboard ships, a new 18-in. incandescent searchlight with pilot house control or flat base, is announced by the Westinghouse Lighting Division. Intense beam concentration is obtained by a primary precision-ground and polished silvered glass reflector, and a metal secondary reflector to permit continuous operation with lamps up to and including 1500 watts. A tandem reflector shield, mounted in the center of the primary reflector, eliminates all secondary heat concentration on the lamp bulb. Heat dissipation is by radiation, permitting a dust-tight inclosure. Body and back sections of the housing are of sheet steel, door and door frame are of cast iron with integrally cast hinge and lathe lugs. The door is clamped in position against a weather-tight heat-resisting gasket or graphited asbestos.—*Westinghouse Lighting Division, Cleveland, Ohio.*

Formulas

Finishers accustomed to using coatings specifically engineered for definite methods of application who have been encountering difficulty with new government specifications which are sometimes unsuited to the shop conditions for which they were intended, will be aided by the Watson-Standard Co., which has announced completion of an exhaustive laboratory study of the problem and the development of a series of formulas which meet government specifications but are engineered to specific shop conditions.—*The Watson-Standard Co., Pittsburgh, Pa.*

Fighting Bombs

A new product, Send-Ex, is being marketed by the S. Obermayer Co. for use in extinguishing magnesium bombs and fires. A granulated coal tar pitch conforming to standards set by the U. S. Bureau of Mines and recommended as being most effective in dealing with magnesium bombs and fires, it comes packed in 12½ lb. rectangular tubes which can be hung on the wall or placed at strategic points in a factory, ready for instant use.—*S. Obermayer Co., 2563 West 18th St., Chicago, Ill.*

P.S. The fifth reason is "mobilized information"

Through a distinctively American process, the Industrial Press, trial and error are reduced to a minimum. Information on successful new techniques flows freely from job to job.

If a factory in Kansas succeeds in laying the dust and stopping ruts in its parking lot, an engineer with the job of quick-surfacing a jungle airport reads how it was done in a construction magazine.

If a shipbuilder finds he can cut construction time in half by building hulls upside down, other shipbuilders learn about it from their technical magazines.

At McGraw-Hill alone 153 editors and 725 field-correspondents are constantly combing construction as well as industrial jobs to find new and faster methods. This "know-how" is then routed through industrial magazines to every industry where it can be helpful.

In addition to the editors, many industrial advertisers keep men in the construction field to watch the performance of their machines. Their reports are used in industrial advertising to show operators how to make machines do more work and last longer in these days of shortages of time and metal.

. . . Now this advertisement contains a moral and "commercial." The commercial objective is obvious. The moral is this:

▶ Let's remember how well government, management and labor are getting along together in the face of visible peril. When the war is all over, we need have no fear of the invisible perils of peace, if we tackle our jobs in the same cooperative spirit.

THE McGRAW-HILL NETWORK

More than 1,000,000 of the executives, designers and production men, who give America her world supremacy in technical "know-how," use the editorial and advertising content of the 23 McGraw-Hill publications as a means of exchanging ideas.

McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

McGRAW-HILL PUBLISHING COMPANY, INC.
330 WEST 42nd STREET • NEW YORK

THE McGRAW-HILL NETWORK OF INDUSTRIAL PUBLICATIONS

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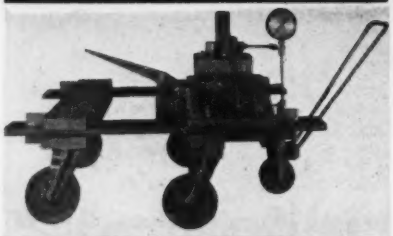
Engineering & Mining Journal
E. & M. J. Metal and Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Food Industries
Mill Supplies
Power
Product Engineering
Textile World
Transit Journal
Wholesaler's Salesman

Adaptable
to many uses on
CONSTRUCTION
PROJECTS



VULCAN
PORTABLE
Hydraulic PRESSES

MOUNTED ON WHEELS
EASILY TAKEN TO THE WORK

This valuable, economical performing, substantial multi-use machine not only saves time, but is highly efficient in the shop or out on the construction project.

Each press tested at our factory to rated capacity and must hold this pressure for more than 24 hours without appreciable drop.

Supplied with a lifting chain, these presses can be quickly slung up and taken down. Equipped with brass pump for added ruggedness and dependability. The gauge is graduated, indicating the total tons on the ram as well as the pounds per square inch.

Available in 60-ton capacity, 6-in. ram diameter, 850 lbs. standard bars, and in 100-ton capacity, 7¾" ram diameter, 1550 lbs. standard bars. Quotations will be given on special side bars.

Get your copy of Bulletin No. 10 now to get full details.

★

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago Illinois

Manufacturer's Activities

Personnel changes and new plans

The appointment of V. A. Jevon and A. J. Hazlett as assistant general managers of sales of the Jones & Laughlin Steel Corporation has been announced. Mr. Jevon, left, has been assistant to the vice president in charge of sales since October, 1938. Prior to that he was district sales manager of Baltimore, having started with the corporation in that position in April of 1938. Mr. Hazlett, right, has been manager of the strip-sheet sales department of the corporation since 1938. Prior to 1938 he had been president of the Eastern Rolling Mill Company of Baltimore, Md. His entire business experience has been in the steel industry.

HAROLD F. MARSHALL, sales and advertising executive for WARREN WEBSTER & Co., Camden, N. J., has been ordered to active duty with the U. S. Army Air Forces, with the rank of captain.

FREDERICK HEATH, JR., secretary-engineer for COLONIAL CLAYS, INC., of Worcester, Mass., has resigned the post to accept a position with the OWENS-CORNING FIBERGLASS CORP., at Toledo, Ohio.

The E. F. HOUGHTON CO. has announced establishment of a branch plant in San Francisco for the manufacture of its products. The new factory is located at Quint St. and Davidson Ave., affording approximately 30,000 sq.ft. of floor space.

CLOUD WAMPLER, executive vice president of CARRIER CORP., has been elected president to succeed the late J. Irvine Lyle. Mr. Wampler has been associated with the corporation since 1934 when he became a member of the board of directors.

JOHN M. LUPTON has been appointed advertising manager for the ACHESON COLLOIDS CORP., Port Huron, Mich. He was formerly advertising manager for the ROBINS CONVEYING BELT CO. of Passaic, N. J.

HARRY C. BEAVER has been elected president of WORTHINGTON-GAMON METER CO. to succeed the late E. T. Fishwick. Mr. Beaver is also president of the WORTHINGTON PUMP AND MACHINERY CORP. R. R. ANDERSON, treasurer and manager of Worthington-Gamon, has been elected vice president and director.

Answering a definite need for a complete and accurate treatise on science's latest contribution to lighting progress, a new lighting book entitled "Fluorescent Lighting Manual" has been written by CHARLES L. AMICK of GENERAL ELECTRIC'S Nela Park engineering department at Cleveland. The book is so written that nearly everyone, whether he has much electrical background or not, can gain interesting, practical information on fluorescent lighting from any of its ten chapters. Chief purpose is to provide a ready reference source for the fundamental

MARCEDES SMUK, secretary of a drive in which $27,900 worth of bonds were sold to employees of THE AUSTIN CO. recently, accepts a Minute Man Banner presented by Brig. Gen. Newell C. Bolton, retired (left), co-chairman of the drive for Greater Cleveland, Ohio. At Miss Smuk's right is CARL J. GIBLIN, JR., chief timekeeper, and at her left is A. H. LINDQUIST, drive chairman.

"With GULF LUBRICANTS we get long low-cost service from our equipment"

Says contractor on mountain highway job.

"Proper lubrication helps us avoid excessive wear and serious mechanical troubles"

"WITH new equipment and repair parts hard to get, more than ever we rely on proper lubrication with Gulf oils and greases," says highway contractor. "Gulf lubricants provide the kind of protection that enables us to secure long, low-cost service from every unit."

Good lubrication—always a necessity for the satisfactory operation of contractors' equipment—today is a vital requirement for the successful completion of tough jobs on schedule. For new units are increasingly hard to get even with high priorities. Breakdowns can well be a serious matter.

So play safe on your next job—ask a Gulf engineer to recommend the right lubricants for each piece of equipment you are using. His recommendations are based on broad experience and knowledge gained through daily contacts with contractors' problems in the field.

Gulf quality lubricants and fuels are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY · GULF BUILDING · PITTSBURGH, PA.

OIL IS AMMUNITION . . . USE IT WISELY!

When you *specify*
SCHRAMM
COMPRESSORS

Design in Construction makes these Compressors the "Lightweight Champions" of the World

Without sacrificing an ounce of pressure or a day of hard-hitting useful life Schramm gives you a compressor with a weight saving up to 40% . . . Take a look at the straight-in-line vertical cylinders, cast en-block—a compact arrangement that makes for streamlining and releases critical materials which are so badly needed in our present crisis. So, for any job that requires compressed air—Drilling, Concrete Breaking, Tamping, Demolition, Trench Digging, Pile Driving, Riveting, etc., specify Schramm—the Lightweight Champion that can step out of its class and take on the toughest of them.

If you want facts and figures on the complete line-up of Schramm Portable and Stationary Compressors, *Write Today for Our Interesting Catalogs—They're FREE.*

PORTABLE • STATIONARY . . . DIESEL • GASOLINE • ELECTRIC . . . 20 TO 420 CU.FT.

SCHRAMM, INC.

WEST CHESTER, PA.

DEALERS IN PRINCIPAL CITIES

knowledge useful in solving the problems which arise in contemporary fluorescent lighting practice.

R. A. BECKER has been appointed manager of the Baltimore branch of GAR WOOD INDUSTRIES, INC., of Detroit. R. J. Grow, the former manager, has joined the armed forces.

HUGH AIKMAN, secretary and publicity manager of J. H. WILLIAMS & Co., manufacturers of drop forgings and drop forged tools, died at his Buffalo home recently. He was 72.

GEORGE P. DAVIS, 53, of Charlotte, N. C., district representative for the YALE & TOWNE MFG. and ECONOMY ENGINEERING CO., died recently.

UNITED HOISTING CO., INC., distributors of new and used construction equipment, has announced the removal of its offices and plant from New York City to 5 West Sheffield Ave., Englewood, N. J.

The NATIONAL EXCAVATION AND STRUCTURES CORP. has announced its corporate name has been changed to NATIONAL STRUCTURES CORP.

HANS BOHUSLAV, formerly with the ENTERPRISE ENGINEERING CO. of San Francisco, has joined the STERLING ENGINE Co. at its Buffalo, N. Y. offices, as vice president in charge of engineering. Widely known as an authority on diesel and gas engines. Mr. Bohuslav served on the West Coast as consultant for various concerns, and on special assignments for the War department and other government agencies.

HERBERT MERRILL LOFTON, 74, formerly general manager and treasurer of the Columbian Iron Works at Atlanta, Ga., died recently at Chattanooga, Tenn.

HERSCHEL E. POST has been appointed general sales manager, industrial finishes, PITTSBURGH PLATE GLASS CO. Mr. Post previously was manager of the company's Houston, Texas, paint factory.

OSCAR HILL TRUE, 64, head of the Property Tax Department of the UNITED GAS PIPE LINE CO., died recently at Shreveport, La.

The AMERICAN BLOWER CORP., a pioneer in the development and manufacture of fluid drives, received official recognition of its contribution to the war

North American Aviation plant. Medusa Products used in the Building.

WINGS

OVER *white* CEMENT FLOORS

The use of "Medusa White," the original white Portland cement, for floors in leading aircraft manufacturing plants is receiving widespread attention throughout the architectural and engineering professions. Enough of these white floors have been laid and used to prove their tremendous advantages in light reflecting, particularly for work under plane wings. Tests show that the "Medusa White" floor has a reflecting factor of 44% as compared to 27.4% for gray cement. Further, the white floor decreases eyestrain and eye-fatigue. This means that in practically every part of the plant with exception of those places where the greasy operations are carried on, the white floor is a tremendous aid in increasing production through its ability to reflect and diffuse light. With the use of "Medusa White" floors, there's a substantial saving in installing lighting fixtures and the consumption of electricity. Even considering higher maintenance costs, the "Medusa White" floor pays for itself in less than a year. A "Medusa White" floor can be laid over old gray concrete floors. Outside of the aircraft field, the white floor has tremendous possibilities in stores, laboratories, factories, hospitals, schools and offices. Now is the time for you to investigate the use of "Medusa White" for floors you have under consideration. Our Engineering Department will be glad to work with you.

MEDUSA PORTLAND CEMENT CO.
1001 MIDLAND BLDG. · CLEVELAND, OHIO
Also made by Medusa Products Co. of Canada, Ltd., Paris, Ontario

CELOTEX BUILDING PRODUCTS

Are Immediately Available for Emergency Industrial Building!

WHAT KIND OF BUILT-UP ROOF FOR THAT NEW ADDITION?
GOT TO HAVE QUIET IN OFFICE AND PLANT!
GOT TO PUT UP A LOT OF PARTITIONS FAST!
THERE MUST BE A FLOOR MATERIAL TO TAKE UP SHOCK!
WHAT CAN I GET FOR EXTERIOR WALLS?

Many New Products Now Added to Line

Can Save Weeks of Waiting for "Frozen" Materials!

CONVERSION to war production often requires extensive remodeling. Many conventional materials simply can't be had, regardless of urgency. But Celotex Building Products are readily available—NOW! And, with the addition of many new products specially planned to replace "frozen" materials, they can meet a majority of your emergency building needs!

Whether your immediate need is for insulating exterior walls or factory sound conditioning—whether your current "must" calls for shock-absorbing floors or built-up roofs or substantial partitions—let Celotex Building Products help when you're "on a spot".

Every product marketed under the Celotex name meets rigid Celotex quality standards. All will perform exactly as represented. They are already widely used in government projects from coast to coast. *Write for new booklet giving complete facts!*

CELOTEX
BUILDING PRODUCTS

The word Celotex is a brand name identifying a group of products marketed by The Celotex Corporation.

THE CELOTEX CORPORATION • CHICAGO

effort recently, when it was awarded the Navy "E" Burgee for outstanding performance.

JOSEPH GRUNDY SHRYOCK, president and chief engineer of the BELMONT IRON WORKS, recently was presented the honorary degree of Doctor of Science in Engineering at the Pennsylvania Military College, Chester, Pa.

DRAKE WYMAN & VOSS, Portland contracting concern, has just observed its 20th anniversary. This firm was established in 1922 by DONALD M. DRAKE, the present president-treasurer.

EUGENE WORTHING, 76, president of the BAYLEY BLOWER CO., of Milwaukee, died at his home there recently.

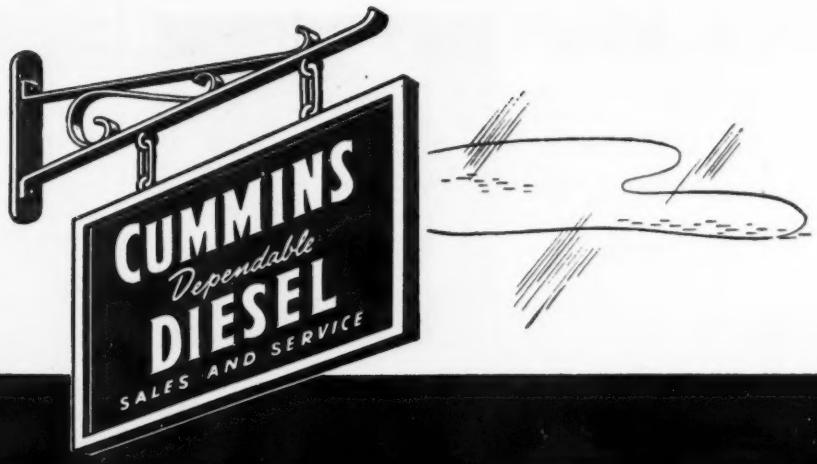
ALBERT J. MAURER, 61, president of BARTEL-MAURER CO., Milwaukee excavating firm, died at a hospital in Milwaukee recently. He headed the firm since 1923.

HARRY C. BEAVER, president of the WORTHINGTON PUMP & MACHINERY CORP., recently attended ceremonies at the company's Harrison, N. J., plant to mark the award of a Navy "E" pennant for excellence of production. More than 4000 company employees and 3000 spectators also attended.

ROBERT L. COE, vice-president of CHASE BRASS & COPPER CO., INC., was elected president of the Copper and Brass Research Association at its 22nd Annual Meeting recently in New York. Other officers elected were: JOHN A. COE, president of the AMERICAN BRASS CO., WYLIE BROWN, president of the PHELPS DODGE COPPER PRODUCTS CORP., R. E. DAY, president of the BRIDGEPORT BRASS CO., C. L. SMITH, treasurer of the NATIONAL COPPER & SMELTING CO., and WM. M. GOSS, vice-president, SCOVILL MANUFACTURING COMPANY—vice president; C. DONALD DALLAS, president of REVERE COPPER & BRASS, INC., treasurer; BERTRAM B. CADDLE, secretary.

Employees of the FOXBORO COMPANY who have completed 25 years or more in its service, were guests of the company at a celebration held recently at Foxboro, Mass. A jeweled service pin of gold was presented to each of the 50 men and women thus honored.

A useful wall card which gives complete instructions for the proper installation and care of rubber transmission belts, V-belts and conveyor belts has been prepared by THE MANHATTAN RUB-



CUMMINS DIESEL SERVICE BUILT AROUND THE *Customer's Needs*

Who is better qualified to specify the kind of service he needs than the man who operates an engine? Who is better qualified to judge service than the owner?

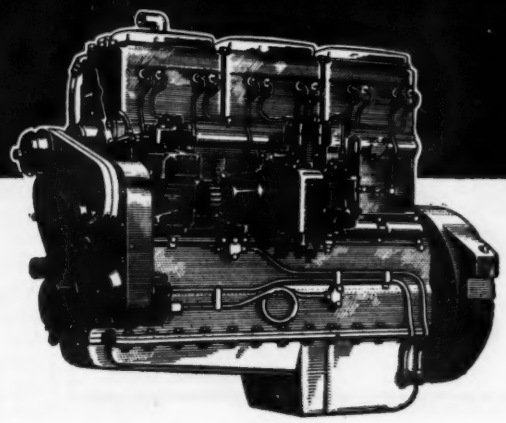
That's why in 1933, the Cummins Customer Service Policy was built around the owner's needs . . . that's why it has continued on that same basis ever since.

One central parts stock at all major points reduces unnecessary duplication of parts . . . conserves the available supply. During the War, this is important.

Cummins was the first to establish this customer service policy . . . just as the Cummins Diesel was the first high speed, field-tested diesel to be accepted in heavy-duty, long line truck operations.

Today, Cummins Dependable Diesels are found in all branches of industry. They are doing their part in the War as standard power equipment for all kinds of dirt moving machinery and various other types of service. Their dependability and low cost operation are a matter of record in all types of heavy-duty work . . . automotive, industrial and marine.

CUMMINS ENGINE COMPANY
Columbus, Indiana



Now is the time to TEST THIS SELF-LOCKING NUT ON YOUR EQUIPMENT...

WITH our entire production going into airplanes, tanks, gun mounts, patrol boats, and other tools of war, it is not possible at this time to furnish Elastic Stop Nuts for all requirements.

However we *are* in a position to offer sample nuts *for testing on any equipment* ... with a view to future application. No cost or obligation ... *Just specify your requirements.*

» Write for folder explaining the Elastic Stop principle.

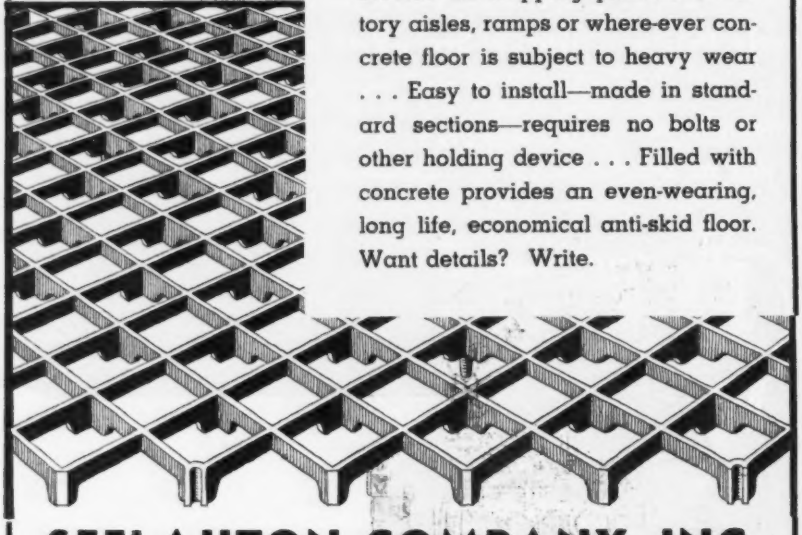
ELASTIC STOP NUT CORPORATION
2331 VAUXHALL ROAD • UNION, NEW JERSEY

Elastic Stop SELF-LOCKING NUTS

SEELAUTON

CAST IRON FLOOR GRIDS

A distinctly new floor grid developed for exceptionally heavy duty service on shipping platforms, factory aisles, ramps or where-ever concrete floor is subject to heavy wear ... Easy to install—made in standard sections—requires no bolts or other holding device ... Filled with concrete provides an even-wearing, long life, economical anti-skid floor. Want details? Write.



SEELAUTON COMPANY, INC.
2500 West 27th St. CLEVELAND, OHIO

BER MFG. DIV., RAYBESTOS-MANHATTAN, INC. The card may be obtained from the manufacturer by requesting Form No. 6576.

The ERGOLYTE MFG. CO., makers of Ergolyte a.c. electric arc welders, has announced the opening of a new plant at 3627-29-31 N. Lawrence St., Philadelphia, Pa. The new factory is more than twice the size of the firm's previous Philadelphia plant.

WILLARD L. HARTLEY, 39, a sales engineer for the Bucyrus-Erie Co., Milwaukee, died recently.

The Gary works of the UNITED STATES STEEL CORP. set a new record early in May when the plant operated at 112.3 percent of theoretical capacity.

CHARLES A. MABEY, physicist for the BRISTOL CO., manufacturers of industrial process instruments and automatic control apparatus, has been appointed director of the research activities of the company, with headquarters at Waterbury, Conn. Mr. Mabey has been in the company's employ for several years.

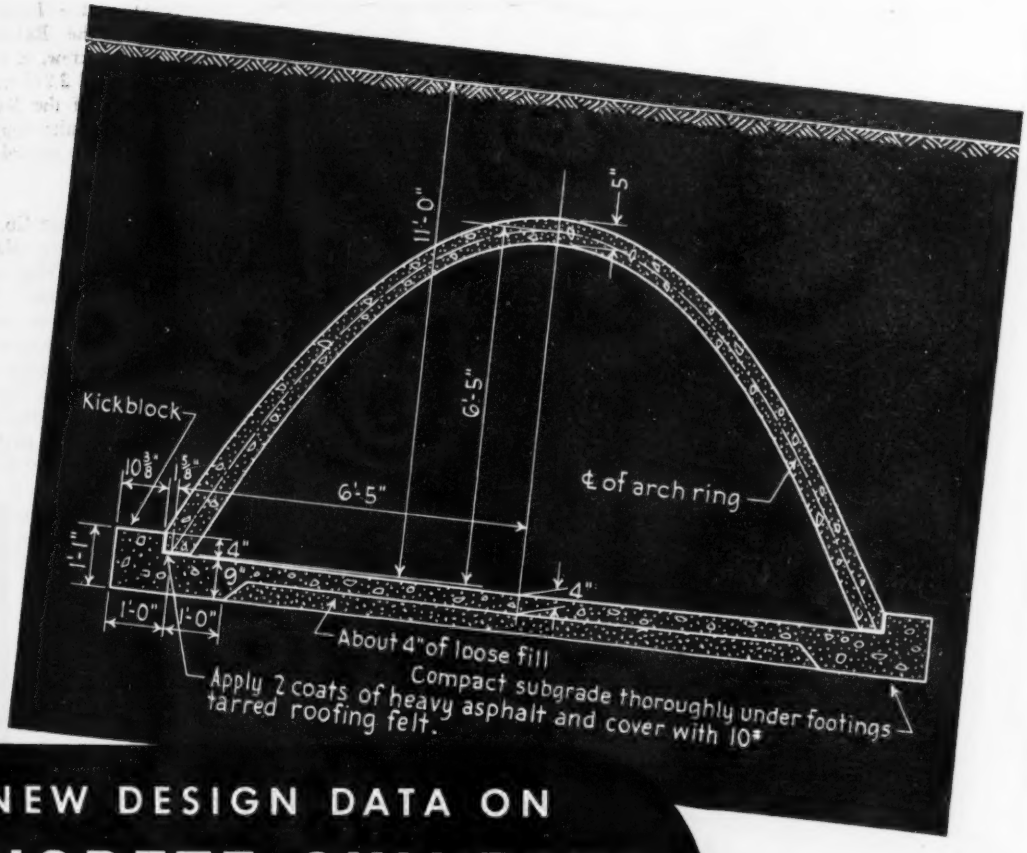
MERVILLE C. NEEL has been appointed chief of the engineering staff of RILCO LAMINATED PRODUCTS, INC. Mr. Neel was formerly structural engineer of the Wisconsin Industrial Commission, and will make his headquarters in St. Paul, Minn. R. W. HELMS has been appointed general manager of sales of the BERGER MANUFACTURING DIVISION, REPUBLIC STEEL CORP., succeeding J. W. Strong, who died recently.

WILLIAM C. JOHNSON, formerly sales manager of the crushing and cement division of the ALLIS-CHALMERS MFG. CO., Milwaukee, has become manager of the general sales organization.

HENRY G. RITER, 3RD., senior partner in Riter & Co., New York, has been elected chairman of the board of COPPERWELD STEEL CO., Warren, Ohio.

SAMUEL F. BAKER, formerly of New York, has been elected president of the BARIUM STAINLESS STEEL CORP., Canton, O.

A new record for the production of shell forgings on a single manufacturing line has just been established by the NATIONAL SUPPLY CO. of Pittsburgh, according to F. G. SCHRANZ, divisional vice



NEW DESIGN DATA ON CONCRETE CULVERTS *without reinforcing steel*

To aid in the war program, the Portland Cement Association has prepared data for rapidly designing concrete culverts *entirely without reinforcing steel.*

New Information Sheet, *"Plain Concrete Culverts,"* shows how to design parabolic two-hinged arches—ideal culvert type for saving steel, with least amount of concrete, too. The simple design method given is applicable to all local conditions.

Besides conserving steel in culverts and many other wartime structures, concrete can often save transportation, since the bulk of concrete material is usually found locally. Our purpose is to help concrete give maximum service in meeting these vital requirements while providing the necessary strength, durability and fire resistance.

★

Technical assistance is available to designers and builders on all types of war construction

★

PORTLAND CEMENT ASSOCIATION
Dept. 7c-17, 33 W. Grand Ave., Chicago, Ill.

Please send me new Information Sheet, *"Plain Concrete Culverts"* (Available free in U.S. or Canada).

Name _____

Title or Occupation _____

Address _____

City _____ *State* _____

BUY WAR SAVINGS STAMPS AND BONDS

Use R B & W Bolts and Nuts . . .

Quick-starting, quick-tightening because they are accurately, uniformly sized and threaded — and carefully inspected.

Vibration-resisting, shock-resisting because the manufacturing method insures extra strength, and all processing is controlled from raw rod to finished product.

EMPIRE AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

RB&W *Making strong the things that make America strong*

Russell, Burdsall & Ward Bolt and Nut Company. *Factories at* Port Chester, N. Y., Rock Falls, Ill., Corsopolis, Pa.; *sales offices at* Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, San Francisco, Portland, Seattle

president of the BALDWIN SOUTHWARK division of the BALDWIN LOCOMOTIVE WORKS. One crew, in a single eight-hour shift, produced 2,277 artillery shell forgings on one of the Baldwin Southwark shell forging units, topping the previous shell production record of 2,181 forgings in eight hours.

The WHITE MOTOR CO. has announced a cooperative two-way plan to aid in keeping existing vehicles in service for the duration of the war. Effective May 27, the plan embodies preventive maintenance—the setting up of a definite schedule based on mileage or elapsed time, and second, parts conservation, which includes the keeping of an adequate stockpile of spare parts and rebuilding of worn or otherwise damaged parts.

To coordinate the executive activities of the LETOURNEAU CO. and thereby increase its effectiveness in the war effort, MURRAY M. BAKER, of Peoria, Ill., has been appointed to the newly created post of executive vice president. Mr. Baker has been associated with earth moving and heavy construction equipment since 1909, when the Holt Mfg. Co., now CATERPILLAR TRACTOR CO., first established its offices in Peoria. He has been a director of the LeTourneau Co. for the past 4 years.

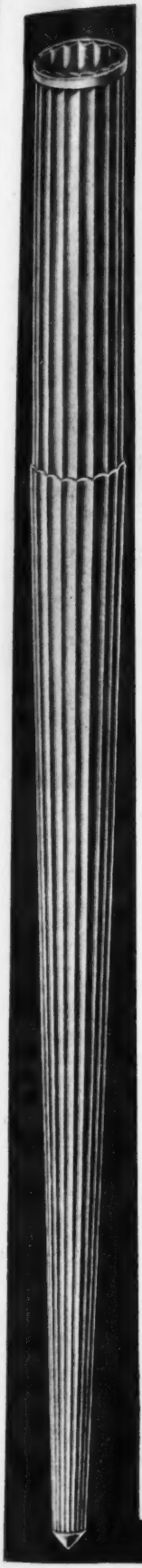
FRANK CLARKE has been appointed general manager of warehouses for the PITTSBURGH PLATE GLASS CO., succeeding B. J. Cassady, who resigned recently because of ill health.

At a recent meeting of the board of directors of the BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE CO., Elyria, Ohio, E. R. BREECH was elected president to fill the vacancy caused by the resignation of Vincent Bendix.

The MCKENNA METALS CO., of Latrobe, Pa., has announced the appointment of ROBERT H. PYLE as district representative for the company in southern Indiana.

ARTHUR M. HOUSER, engineer of standardization for the CRANE CO., Chicago, has been appointed consultant in the simplification branch of the Bureau of Industrial Conservation of the War Production Board.

E. F. JOHNSON has been elected a vice president of GENERAL MOTORS CORP., and has been appointed as group executive in charge of the recently organ-



MONOTUBES are deep in the hearts of 34 STATES!

Engineers and construction men everywhere are switching to the Monotube Method to save time on foundation work!

UNHEARD of only 14 years ago, the Monotube Method of installing cast-in-place concrete piles has been used to date in 34 of the 48 states and in the District of Columbia. Sizeable installations have also been made in Canada, Panama, the Bahamas, Hawaii and South America.

Today, under the impact of war, engineers and construction men in ever-increasing numbers are turning to Union Metal Monotubes because of their proven ability to produce foundations faster Whatever the nature of *your* jobs, Monotubes will give you these *four* time-saving advantages:

1. ***SPEEDY Handling.*** Monotube steel casings are light in weight for fast and economical handling.

2. ***SPEEDY Driving.*** Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment (crawler crane, equipped with standard leads and hammer).

3. ***SPEEDY Extension.*** Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste—even in low headroom.

4. ***SPEEDY Inspection.*** Hollow, tubular design enables you to inspect casing quickly and thoroughly from top to toe, prior to concreting.

Union Metal Monotubes are made in a gauge, taper, and size to meet load-bearing requirements in *any* soil condition. And experienced Union Metal engineers will show you how they can be used to best advantage. Write today for Catalog No. 68A.

THE UNION METAL MANUFACTURING COMPANY

Canton, Ohio

SABOTAGE

Can start on the drawing board

Inferior tracing cloth can sabotage your drawings just as effectively as enemy agents.

And it's so easy to be fooled! You'll find the lowest-grade tracing cloths clean and transparent when you buy them. But try making blue prints a year or two later. The cloth will be brittle – yellow — so opaque your drawings are blotted out.

Don't take this chance! We know how much time and sweat you put into a drawing. That's why Arkwright Tracing Cloths are highly transparent – and made to *stay* that way, to give your drawings *permanent* protection. That's why Arkwright has been recognized as the leading American manufacturer of tracing cloth for over twenty years. Next time *you* order, specify Arkwright. Arkwright Finishing Company, Providence, R. I.

Arkwright TRACING CLOTHS

NEPTUNE METER COMPANY
THE WORLD'S LARGEST MAKERS OF LIQUID METERS
1892 . . . 1942
50 West 50th St., New York City
Branches in Principal American Cities and in Canada
Trident Meters

MITCO
OPEN STEEL FLOORING
Pressure Formed
90% Open Area
Easy to Install
Hendrick Manufacturing Company
45 Dundaff Street, Carbondale, Pa.

ized Eastern Aircraft Division of the company.

E. W. BLISS CO., of Brooklyn, N. Y., manufacturers of metal working equipment, have been granted manufacturing rights for MEEHANITE castings to be made at a foundry in Hastings, Mich.

The YOUNG RADIATOR CO. awarded War Savings Bonds and Stamps to six employees at a plant "Volume for Victory" meeting recently, as rewards for contributing suggestions for increasing the company's production output of war materials. FRED M. YOUNG, company president, made the award and said that EARLE WARREN, a core assembler, had contributed the outstanding suggestion when he devised an improved method of stacking, storing and salvaging the copper fins for the company's various types of heat transfer units.

WILLIAM M. BLACK has been elected a vice president of the AMERICAN BRAKE SHOE & FOUNDRY CO. President of the AMERICAN MANGANESE STEEL division of the company since 1940, Mr. Black will continue in that capacity. He joined the division in 1912, becoming general sales manager in 1934 and vice president in 1935.

BERN DIBNER, a founder and vice president and general manager of the BURNDY ENGINEERING CO., 459 East 133d St., New York, has reported for active duty in the Air Corps with the rank of captain. MARVIN LEE, chief engineer, has been elected acting general manager. FRANK H. DEWEY, general manager of the GAR WOOD air conditioning division, has been elected a vice president of the company.

ROY J. WATKINS, 43, Greenville, South Carolina manager for the CRANE CO., died recently.

CHARLES N. BARNEY, of Scarsdale, N. Y., has been elected a vice president of the WORTHINGTON PUMP & MACHINERY CORP.

WILLIAM C. JOHNSON, sales manager of the crushing and cement division of ALLIS-CHALMERS MFG. CO., has been named manager of the general sales organization of the company.

The TIMBER ENGINEERING CO., INC., Washington, D. C., has opened a branch office in the Yeon Building in Portland,

All the king's horses and all the king's men can't put your DIESEL together again!

Like poor Humpty-Dumpty himself, once your Diesel breaks down—it may very well be a goner. For these days, with priorities in effect, engine parts are almost as scarce as Hope diamonds. At the very least, a breakdown may mean days, weeks, or months of waiting until the necessary parts are replaced.

Today, production is a race against time. Every hour counts. A day lost is victory delayed. A week's halt may spell disaster. No Diesel owner can afford to lose valuable time — there must be fewer stoppages, fewer overhauls. And parts must last longer — even though your engines are driving harder than ever.

Your big problem, then, is how to go *all-out* for victory without *time-out* for repairs . . . how to achieve *efficient, non-stop performance.*

That's where a Cities Service lubrication engineer can be of real service to you. He understands what you're up against, and he speaks your language. Most important of all, he's got the necessary "know-how" to tackle your particular job. Why not get together with him on a lubrication plan that will help you keep your Diesels in continuous operation?

This friendly consultation service is yours for the asking. Simply fill in the coupon below and mail it today.

We'll be glad to send you an informative, up-to-the-minute booklet — "Diesel Engine Lubrication." Just check the space indicated !

OIL IS AMMUNITION—USE IT WISELY!

CITIES SERVICE OILS
ONCE-ALWAYS

Write to —
CITIES SERVICE OIL COMPANY
Room 1326, Sixty Wall Tower, N. Y.
or any of the following offices:
CHICAGO . CLEVELAND . ST. PAUL
KANSAS CITY . BOSTON . TORONTO
or to
ARKANSAS FUEL OIL COMPANY
SHREVEPORT . ATLANTA . BIRMINGHAM

Please send me information concerning your Engineers' Lubrication Service. ☐

Please send me your booklet, "Diesel Engine Lubrication." ☐ ENR.

Name_____

Firm Name_____

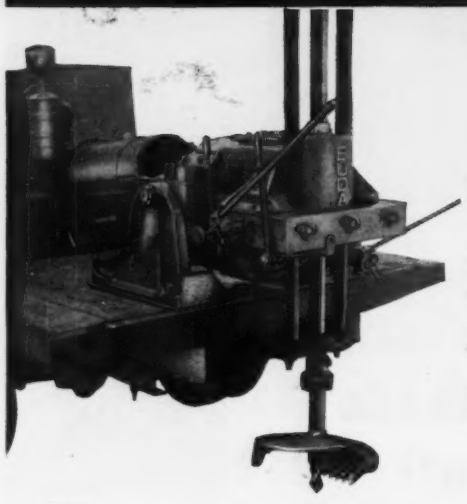
Address_____

City_____ State_____

A LUBRICANT FOR EVERY INDUSTRIAL NEED

BUDA EARTH DRILLS

Offer Maximum Versatility for Wartime Construction



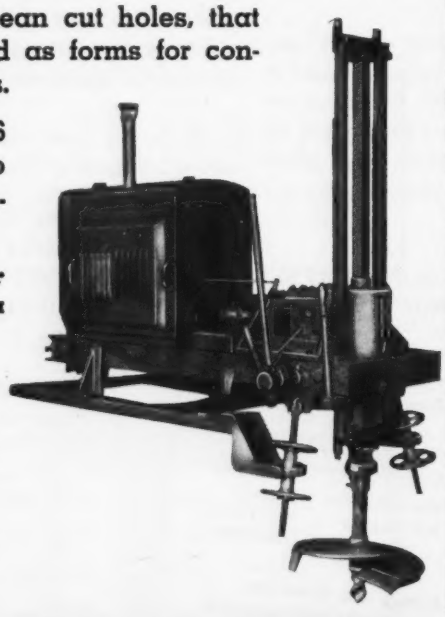
SPEED UP WORK ON:

- **Pier and Batter Pile Holes at Ordnance Plants**
- **Airport Fencing Jobs**
- **Cantonment Buildings**
- **Defense Housing Projects**
- **Foundation work of all kinds**

YOUR construction jobs will progress faster and easier at less cost if you use the Buda Earth Drill.

- **Drills shallow holes at the rate of 25 to 40 per hour.**
- **Drills through hard pan, clay, and impervious materials.**
- **Drills uniform, clean cut holes, that can also be used as forms for concrete foundations.**
- **Diameters from 6 to 42 in., depths to 24 ft. with *self-contained machine.***

Write for full details, or see your nearest Buda Dealer.



Shown above: Model HBE Cradle Type Truck Mounted Earth Drill. Degree of adjustment to vertical, 45 degrees sideways 15 degrees fore and aft.

Right: Model HBD Rigid Head Earth Drill. Degree of adjustment to vertical 15 degrees.

THE BUDA CO. HARVEY (Chicago Suburb) ILLINOIS

Ore. ALDEN K. SMITH, formerly assistant technical director of the National Lumber Manufacturers Association, is in charge of the new office.

MARX HYATT, San Francisco sales manager of the AMERICAN LUMBER AND TREATING CO., has been called to active army service. His position is being filled by FRANK E. RICHTER, former Houston, Texas, representative for the NATIONAL WOOD-PRESERVING ORGANIZATION.

THE EQUIPMENT CORP. OF AMERICA, one of the largest national organizations for rebuilding and marketing construction equipment has undergone further expansion with the purchase of a 250 ft. brick building adjacent to its present properties in Chicago. The new building was purchased from the ALLIS-CHALMERS MFG. CO., and will be used to house much of the rebuilt construction equipment to make room for further rebuilding operations in the main plant.

The CRAFTSWELD EQUIPMENT CORP. has announced the removal of its plant to larger quarters at 2626 Jackson Ave., Long Island City, N. Y.

JAMES P. BARNES, treasurer of the ALABAMA ASPHALT & LIME STONE CO. of Birmingham has been appointed WPB Director for the State of Alabama.

ALFRED SONTAG, for ten years chief engineer and sales manager of the RIEHLE TESTING MACHINE division of the AMERICAN MACHINE AND METALS, INC., has joined the staff of the testing machine department of the BALDWIN LOCOMOTIVE WORKS in Philadelphia.

Despite the curtailment of peace-time product manufacturing, the TIMKEN ROLLER BEARING CO.'s staff of field engineers is being kept virtually intact to engineer and service hundreds of new war-time applications. The few field engineers who have been called to the home office in the company's "round-the-clock production" of many war items will assist in this work for the duration, after which they will resume field engineering work in their respective divisions.

To make possible the building of more and better heated homes for war workers, the AIRTEMP DIVISION OF CHRYSLER CORPORATION at Dayton, Ohio, has developed a new type of ductwork for forced-air furnaces which is said to save 4 out of 5 lb. of the metal previously required.

The YOUNG RADIATOR CO., manufacturers of heat transfer products for the aircraft, automotive, marine, transportation, building and other fields, has announced the appointment of Aircraft Steel & Supply

NEEDED: A Million Dollar Water Supply for a One-Horse Town

WILLOW SPRINGS, U.S.A.
1942 *Population 750 . . . Chief Industry—FARMING*
1943 *Population 50,000 . . . Chief Industry—BOMBS*

There's a Willow Springs in every state of the Union. When one of these peaceful little towns hitches its wagon to a war, there's a lot of groundwork that must be done before a factory whistle can be blown and production started. A tremendous housing project and industry alike must be adequately supplied with water. A modern water system and supply pipe line must replace the old town pump. The Lock Joint Pipe Company is now playing a major part in the conversion of farmland to war industry, in supplying defense factories and homes with an ample and dependable supply of water. Today Lock Joint Reinforced Concrete Pipes also underlie many important army and naval bases throughout the land. They have been specified because of their proven strength and dependability and because this type of construction requires less of those materials so essential to the war effort. Speedily installed, these pipe lines—high in carrying capacity, low in cost—are proving their efficiency and economy in the service of man, machine and country. *Lock Joint stands ready to serve you and your Willow Springs project.*

LOCK JOINT PIPE COMPANY
Established 1905
AMPERE, NEW JERSEY
Denver, Colo. · Chicago, Ill. · Kenilworth, N. J. · Kansas City, Mo. · Rock Island, Ill.
White Plains, N.Y. · Valley Park, Mo. · Cleveland, Ohio · Hartford, Conn. · Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

HANDLE MORE YARDS PER $

Sauerman 2 cu. yd. Slackline Cableway digs a 40,000,000-gal. reservoir in 154 days, placing all the spoil in one long, high pile.

This Picture Shows a Small Sauerman Scraper Reclaiming Coal Mine Screenings from Waste Pile to Washing Plant.

The first cost of a Sauerman Cableway or Drag Scraper machine for the average long haul job compares favorably with the cost of any other equipment that will dig, haul and place an equal yardage of materials.

Moreover, a Sauerman machine is easy to operate and demands little by way of repairs, assuring a minimum daily expense.

These machines have working ranges of 100 to 1500 feet, and handling capacities from 10 to 600 cu. yd. per hour.

Tell us about your problem and we will offer our advice on equipment, also send you our catalog.

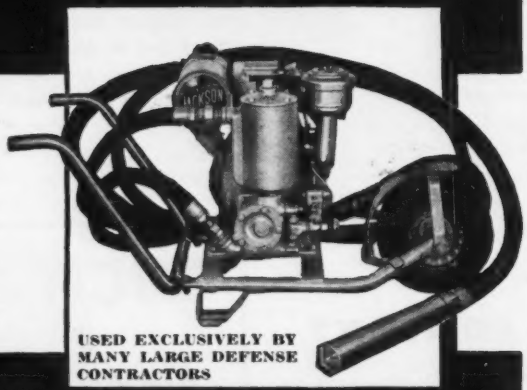
SAUERMAN BROS., INC. 532 S. Clinton St., Chicago

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT *. . Buy the Fast . . .*

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY EVERY DAY

- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.



USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICHIGAN

Co. of Wichita.

The second citation for the Navy "E" Burgee for achievements in production of naval ordnance has been granted the AMERICAN LOCOMOTIVE Co.

RANDOLPH L. FORT has been appointed assistant director of public relations by the TENNESSEE COAL, IRON & RAILROAD Co.

R. A. MCCAFFREY has been made southern traffic manager for the plants of the UNITED STATES CAST IRON PIPE & FOUNDRY Co. at Bessemer, Birmingham, Chattanooga and Anniston. He was formerly assistant traffic manager for the Birmingham operations and will retain his office at Birmingham.

The KOTAL Co. of New York has announced the appointment of the UNION BUILDING & CONSTRUCTION CORPORATION of Passaic, N. J., as distributor for Kotal.

The KEYSTONE CARBON Co. of St. Marys, Pa., manufacturers of precision molded products, are completing a large program of expansion including plant and production facilities.

The ROGERS DIESEL AND AIRCRAFT CORP. recently changed its corporate name to the CUMMINS DIESEL ENGINE CORP. OF NEW YORK.

ROBERT T. KAIN, sales engineer in the belting department, industrial products sales division, of the B. F. GOODRICH Co., has resigned to enter the service of the United States Navy.

J. IRVINE LYLE, president of the CARRIER CORPORATION and one of its founders, died at Syracuse, N. Y., recently after a brief illness. In 1902, Mr. Lyle collaborated with Dr. Willis H. Carrier in developing the first scientific air conditioning system. Sixty-eight years of age at his death, Mr. Lyle was a native Kentuckian, and graduate of the University of Kentucky with a degree in engineering.

A new firm of consulting management engineers—DRY, LAWSON & Co.—recently opened its doors at 135 S. LaSalle St., Chicago. Senior member is GEORGE A. FRY, and associated with him are A. WERNER LAWSON, ROBERT F. DICK, GEORGE N. SAUM, KYLE L. MENUEZ and PHILIP RODEN.

LOUIS C. KUEHNER, 48 years president of HANDLAN, INC., a railway supply firm of St. Louis, Mo., died June 8 at St. Louis.

Sale of the Mead-Penn Iron Works plant at Meadville, Pa., by the PENNSYLVANIA ENGINEERING WORKS of New Castle, to

TALON, INC., is announced. All operations of the plant will be transferred to the Pennsylvania Engineering Works at New Castle, Pa.

D. F. RYDER has assumed an executive position with the synthetics division of the GOODYEAR TIRE & RUBBER CO.

W. E. FLETCHER, general manager of the Ravenna Ordnance plant, has been appointed director of research and development for the ATLAS POWDER CO. of Wilmington, Del.

RICHARD W. SIMON has been appointed manager of the metallurgical division, Pittsburgh district, for the CARNEGIE-ILLINOIS STEEL CORP.

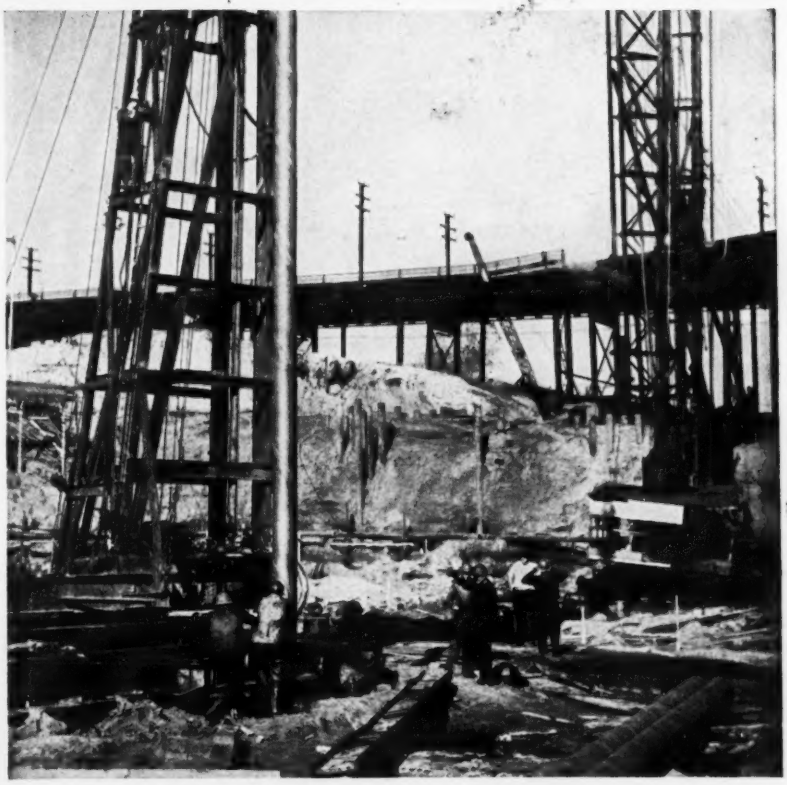
ROBERT E. LEWIS has been elected treasurer of the AMERICAN STEEL & WIRE CO., and JOHN G. NELSON has been promoted to secretary and assistant treasurer.

W. F. ROCKWELL who has been on a leave of absence from his post as president of the PITTSBURGH EQUITABLE METER CO. while he serves as the Director of Production for the Maritime Commission, recently attended the Chicago sessions of the American Water Works Assn.'s Wartime Conference on Water Works problems. He told the group that U. S. shipyard production is now limited only by the capacity of the steel mills.

Sales and service facilities of the WATER TREATMENT CO. OF AMERICA, Pittsburgh, Pa., are being broadened considerably in a concentrated area including western Pennsylvania, West Virginia, Ohio and Indiana, through a distributorship arrangement with AMERICAN RADIATOR & STANDARD SANITARY CORP. branches blanketing this territory. Water Treatment Co.'s method of water conditioning will be sold and serviced by American Radiator & Standard Sanitary branches in Akron, Canton, Cleveland, Columbus, Erie, Lima, Mansfield and other towns in Ohio, Indiana and West Virginia.

The YORK ICE MACHINERY CORP. of York, Pa., because of the increasing volume of its war production contracting, has enlarged and increased the facilities of its Washington office. To be designated as the National sales office, the establishment will operate as a direct factory branch office, located at 215 the Investment Building.

these piles drive straight



This foundation job was speeded by using 90-foot lengths of ARMCO Spiral Welded Piles.

for VICTORY

Fast, accurate foundation work on war construction is a mighty important part of America's drive for Victory. You can help speed this work —and do a better job in the bargain —by using ARMCO Spiral Welded Piling. Here is why:

ARMCO Foundation Piles make for straight driving with a minimum of time and effort. One reason is the tough spiral weld that imparts great beam strength to even the longest lengths. Every section is watertight and "open for inspection" all the way down. Uniform diameters assure complete, low-cost salvage of cut-offs.

You can get ARMCO Spiral Welded Foundation Piles in any specified length (not random) that can be handled and shipped. Diameters range from 6 to 36 inches; wall thicknesses from 3/16 to 1/2-inch. For quotations and shipping promises write, wire or telephone The American Rolling Mill Company, Pipe Sales Div., 2321 Curtis St., Middletown, Ohio.

ARMCO

SPIRAL WELDED FOUNDATION PILES

Water Supply Lines • Caissons • Line Pipe • Prefabricated Pipe • Dredge Pipe • Industrial Pipe

Fast Material Handling with

NOVO HOISTS

TO show you what can be done with a given size, Novo hoist, here is a Double Drum Model DH Hoist powered with a 40 H. P. engine. The front drum operates a material elevator the rear handles an 18½ Cu. Ft., concrete bucket. And here's what it does in one day.—Places 4374 Cu. Ft. of concrete and takes up the brick mortar and material to keep 14 brick layers busy on the fifth floor.

Here are reasons for such performance.

Big, rugged, heavy-duty, 6-cylinder, 40 HP industrial engines furnish ample power.

Easy control with Novo screw thrust which puts a tremendous leverage behind the shifter rod.

Smooth, fast, safe action with Novo double cone friction blocks. They take hold of both sides of the friction groove—twice the effective friction area.

Self-energizing brakes. The drop of the load helps set the brakes resulting in easy handling.

Roller chain drive gives efficient, quiet transmission of power.

A complete line of Builders' and Dragline Hoists —Gasoline, Electric and Diesel.

FREE HOISTING DATA

We have installation Data Sheets that give valuable operating facts on various types of hoisting jobs. Send for free copy.

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LANSING, MICHIGAN

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Send me literature on Novo Hoists ..... size { Type of Work .....
Also send Novo Hoisting Installation Data Sheets ..... }
Name .....
Address .....
City ..... State .....

NEW PUBLICATIONS

Iron—"How Toncan Iron Makes Money for Sheet Metal Contractors and Fabricators," a 16 page booklet on Toncan copper molybdenum iron has been issued by the Republic Steel Corp. The book tells what the iron is, its advantages, where it has been used, gives opinions of contractors who have used it, and lists complete sizes, gages, etc.—*Republic Steel Corp., Cleveland, Ohio.*

Compressors—A well illustrated, well printed bulletin containing photographs and engineering specifications of the new Schramm Fordair compressors, has been issued. The booklet details the company's trailer, crawler, self-propelled and skip type compressor machinery showing its uses and installation.—*Schramm, Inc., West Chester, Pa.*

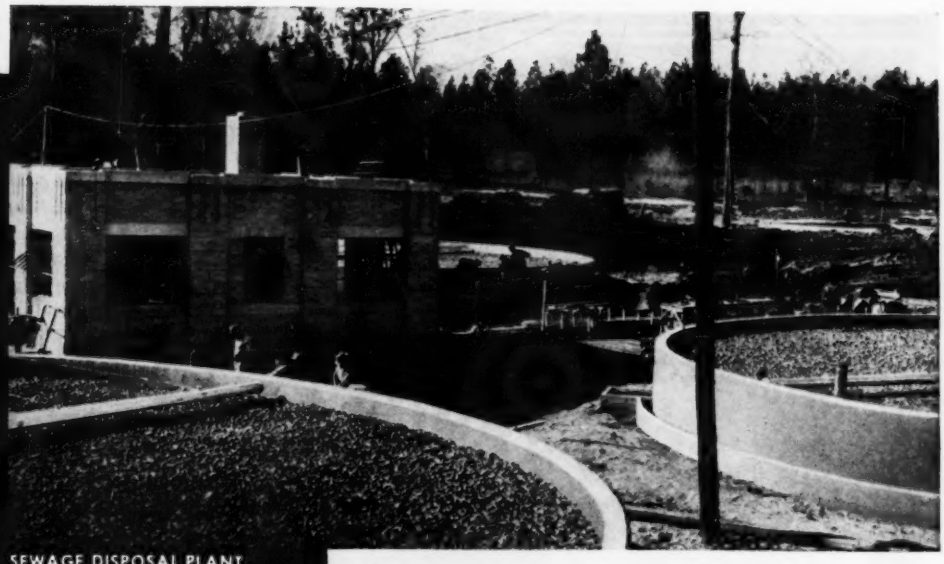
Concrete Vibration—A new bulletin, describing methods of concrete vibration developed by the Viber Co. has been issued. Advertising the organization's Viber vibrators, the bulletin gives diagrams of construction and application of the instrument and its general specifications.—*The Viber Co., 726 So. Flower St., Burbank, Cal.*

Instruments—The Roller Smith Co. has issued a new catalog, 4220, advertising its switchboard instruments and recorders.—*The Roller-Smith Co., Bethlehem, Pa.*

Spectrometer—A new 12 page booklet, giving the history, operating characteristics and details of construction of the mass spectrometer, is announced by Westinghouse Electric & Mfg. Co.—*Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

Rot—A vest pocket size booklet just off the press is called "Stop That Rot". Produced by the C-A-Wood Preserver Co., it shows many typical advantages of the company's product in preserving timber structures.—*C-A-Wood Preserver Co. (Carbolineum America), 6625 Delmar Blvd., St. Louis, Mo.*

War Production—The Northern Pump Co., Navy ordnance plant, has released a 40 page pictorial record of its war production operations and morale methods. Entitled "Building Production Morale," the booklet is a dramatic document of an important Northwest contribution to the war effort. Explained are the methods used by the management, the workers, and the naval personnel at the plant in developing the high state of morale which drove the plant fully two years ahead of contract



SEWAGE DISPOSAL PLANT
at a southern army camp

ROAD through another southern army camp

ARCHITECT & ENGINEER: Benham Engineering Co.
CONTRACTOR: S. & W. Construction Co & Associates

FIRST THE CAMP . . . . . .
THEN THE SOLDIER . . . .
THEN THE VICTORY! . . .

☆

Time, it seems, has become the biggest 4-letter word in our language. With enough time, we win; with the time well used, we win quicker.

That, actually, is what is behind the use of Lehigh Early Strength Cement in so much war construction. Concrete for foundations, runways, roads, buildings is ready for service in 1/3 to 1/5 the normal time; sometimes even overnight. Our pictures were taken at two southern army camps, where Lehigh Early Strength Cement helped get the roads ready quicker, and a sewage disposal plant more promptly on its health-protecting job.

The use of Lehigh Early Strength Cement completely upsets the saying that "haste makes waste," for the quicker-service concrete that it produces is literally a denser, better concrete . . . and as valuable in peacetime as today. The Lehigh Service Department will gladly give you further information, on request.

Lehigh EARLY STRENGTH CEMENT

for **service-strength** concrete in a **hurry**

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

When BIG MACHINES GO INTO ACTION on the "INDUSTRIAL FRONT" They are generally Moved on

ROGERS TRAILERS

ROGERS HEAVY DUTY Gooseneck Trailers

EXPERIENCE BUILDS 'EM
PERFORMANCE SELLS 'EM

ROGERS BROTHERS CORP.
135 Orchard St., Albion, Pa.

schedule, and caused the War Production Board to single the plant out for special praise in its official Progress Report on the national war production drive.—*United States Navy, Branch Public Relations Office, Northwestern Bank Bldg., Minneapolis, Minn., or Northern Pump Co., Columbia Heights Branch P. O., Minneapolis.*

Horse Sense—A four page pamphlet, "Horse Sense," has been prepared for industrial engineers interested in production as well as safety by A. Schrader's Son. The booklet gives valuable information on equipment which will reduce accidents through the intelligent use of compressed air. The safety installations described are said to be not only easy to install and operate, but the most interesting point is that they increase production.—*A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn, N. Y.*

Graphite—Bulletin No. 4, introducing Konag "F," an all purpose colloidal natural graphite additive for lube oils and many greases, has been issued by the National Graphite Co. The product is a suspension in lube oil of colloidal natural graphite blended with laboratory precision for solving many difficult lubricating problems. Konag "F" is said to produce an extremely tough and durable graphoid skin and steps up the lubricating value of oil by providing a better wetted surface by breaking down the surface tension of the oil.—*National Graphite Co., Inc., 17 John St., New York, N. Y.*

Conveyor—A 32-page illustrated catalog and data book No. 2075 on the Link-Belt Bulk-Flo elevator-conveyor has been published. The book contains diagrams showing paths of operation, gives a long list of materials that can be handled, and contains illustrated case studies, with tables of sizes, capacities, dimensions, etc.—*Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.*

Anniversary—A handsomely illustrated booklet, recently released to the 600 employees of Handy & Harman and to be distributed among business associates of the company, marks the organization's 75th anniversary as a business concern. It tells in an unusual way some interesting facts about the company's history, facilities, products and the war work now in progress.—*Handy & Harman, 82 Fulton St., New York, N. Y.*

Conserving Rubber—A 48-page illustrated book on conservation of rubber product in industry has been published by the United States Rubber Co. The rubber products now in use by manufacturers are essential to war production and will become increasingly difficult to replace, the company says. Com-

OHIO LOCOMOTIVE CRANES

15 to 50 TONS CAPACITY

DIESEL • ELECTRIC • GASOLINE • STEAM

The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS . . . OHIO

DRILLING CONTRACTORS

DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

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Foundation Testing for Bridges, Dams and All Heavy Structures
Also
Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

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SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

plete and explicit suggestions are given for the proper care of these important products, from initial design through inventory and storage to use, maintenance, inspection and repair. The book "First Aid to Industry in Conserving Rubber," is completely indexed and all mechanic rubber goods are included, such as hose of all types; transmission, conveyor and elevator belts; mechanical packings; electrical tapes, wires and cables; molded and extruded rubber goods; rubber lined equipment; rubber mountings, mats and matting; printing materials, and rubber and resin bonded grinding wheels.—*United States Rubber Co., New York, N. Y.*

Industrial Switching—Bulletin GEA-3756, dealing with diesel electric engines for industrial switching, has been issued by the General Electric Co. Handsomely illustrated, and containing engineering data and drawings, the bulletin describes the 25-ton two-axle 150-hp. engine produced by the company. The locomotive is designed specifically for use in industrial plants and embodies many features found in railway type switches.—*The General Electric Co., Schenectady, N. Y.*

Pumping Equipment—The pumping equipment of the Indianapolis Water Co. is described in a leaflet distributed by the DeLaval Steam Turbine Co. According to the leaflet, there are five principal pumping stations, in which are installed a total of some 90 DeLaval pumps, varying from small capacities up to 40 million gallons per day. Numerous engineering problems have been solved by the use of various types of pumping equipment, including geared steam turbine centrifugal pumps, water turbine driven centrifugal pumps, motor driven pumps and centrifugal pumps for raising water from wells.—*DeLaval Steam Turbine Co., Trenton, N. J.*

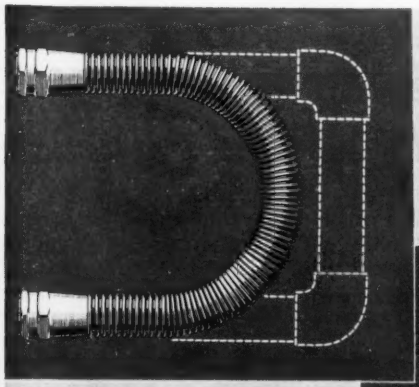
Pumping Control—An attractive new bulletin has been published by the Foxboro Co., describing Rotax electric-operated control as employed in pumping applications. Rotax controllers of the recording and indicating type are shown, together with specimen chart records and installation photos. The text is largely devoted to water works and sewage engineering, but also covers pumping applications which are common in various industrial fields. Schematic diagrams of typical pumping installations are given.—*The Foxboro Co., Foxboro, Mass.*

Pyrometer—The Bristol Co. has just published a folder, Bulletin P1102, describing its newly developed line of Pyrovac radiation pyrometers. The folder gives theory of operation and information regarding the use of radiation pyrometers, and is liberally illustrated with

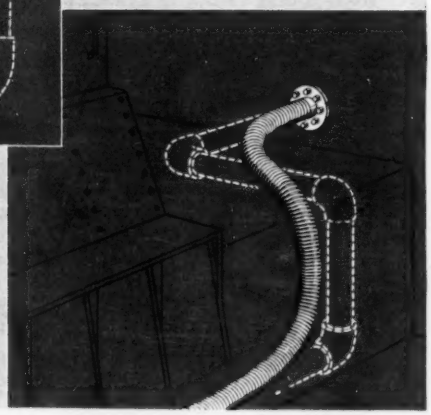
add speed

to assembly, maintenance, repair and temporary hook-ups

Use flexible metal hose . . . for pipe connections where speed of installation is paramount



Rex Flexible Metal Hose can be bent to position by hand and coupled, in a fraction of the time required to fit a pipe connection. ←



Rex Flexible Metal Hose can be "snaked" quickly into place in installations requiring turns, eliminating all intermediate connections. →

Rex Flexible Metal Hose speeds up production, facilitates assembly, reduces down-time. Ask for recommendations on the type of metal hose best suited to your needs from the wide and diverse Chicago Metal Hose production types available.

Use our production capacity to increase your production

Rex-Weld Corrugated Flexible Metal Hose • Rex-Tube Interlocked Flexible Metal Hose • Rex-Flex Stainless Steel Flexible Tubing Avioflex Oil Line Hose • Cellu-lined Hydraulic Hose

CHICAGO METAL HOSE CORPORATION

MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Illinois

Pick out the corner

where most hydrants are broken

. . . and install a SAFETOP Fire Hydrant

IS THERE a street in your community with a bad record for vehicular accidents due to blind corners, steep grades, or traffic density? If so, you can greatly reduce the fatalities, the property damage and the repair expenses arising from collisions which involve fire hydrants by installing Kennedy SAFETOPS.

These unique hydrants, while amply strong to resist ordinary impacts, give way at the Safety Breakable Section if struck in a smashing collision. Breakage of this section prevents the serious consequences that usually follow severe impacts against other types of hydrants. There is no flooding, the water supply need not be shut off while awaiting or making repairs, and the hydrant can be returned to service by one man, within half an hour, without excavating, and at a total cost of less than $10.00 for new parts and labor.

In addition to these important benefits, the Kennedy SAFETOP Fire Hydrant responds promptly and effectively to service demands. Its large-diameter standpipe and smooth water passages keep pressure loss to a minimum, and its simple, sturdy, straight-line mechanism functions easily and positively.

Write for prices and full information

The Kennedy Valve Mfg. Co.

Elmira, N. Y.

KENNEDY

SAFETOP FIRE HYDRANT

REG. U.S. PAT. OFF.

Wood Products—Joseph Kaszab, Inc. has issued Bulletin No. 51, descriptive of the company's facilities for production of wood products. The bulletin illustrates equipment available for production-run work, and also describes engineering and craftsman personnel available for contract production of large or special jobs. —*Joseph Kaszab, Inc., 1444 West 21 St., Chicago, Ill.*

New Development—The Keystone Carbon Co. has issued a bulletin to introduce its newly developed negative temperature coefficient resistance material, developed to compensate for resistance changes due to temperature variation, to reduce or eliminate initial current surge in electrical equipment to provide various degrees of time delay in electrical units, and used as a remote unit for temperature measurement. The bulletin describes make-up of the material and details of its methods of installation and use.—*Keystone Carbon Co., Inc., St. Marys, Penna.*

Dial Scales—The Kron Co., manufacturers of industrial dial scales and war engine testing equipment, will distribute a new 16 page condensed catalog covering the company's line of testing equipment and industrial dial scales. Current industrial dial scales are all of the springless type of mechanism, actuated by compensating pendulums, and embrace all industrial types. The war engine test equipment includes dynamometer scales in all capacities up to and including 800 arbitrary units, fuel consumption testing scales for diesel and gasoline engines, lubricating oil consumption and oil flow testing scales for aviation, tank and marine engines.—*The Kron Co., Bridgeport, Conn.*

Water—A folder just issued by the Layne Co. shows how the organization has fallen in behind the nation's war effort, to aid both the armed services and civilian organizations in supplying adequate supplies of water. The bulletin lists Layne dealers throughout the United States and Canada and in other countries.—*Layne & Bowler, Inc., Memphis, Tenn.*

Circuit Breaker—Low voltage air circuit breakers designed for use on alternating current circuits up to 600 volts and direct current circuits of 250 or 750 volts are described and illustrated in a new 12-page publication. Catalog 2150, just released by the Roller-Smith Co. The catalog lists closing and tripping currents, shows typical methods of making connections to large breakers, gives dimensions of both manual and electrical engineering drawings showing methods of use.—*The Bristol Co., Waterbury, Conn.*

PROTECTING WIRE ROPE AGAINST CORROSION

This is Number 11 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

The preceding article, No. 10 in this series, pointed out the causes of wire rope corrosion, where and when it was likely to strike. This article, No. 11, tells how to guard against corrosion. This and the previous ten articles in the series is available on request on your company letterhead.

Lubrication . . . its importance

No way has yet been found to remove the "causes" of corrosion. However, there is a method of protecting wire rope against corrosive elements . . . against atmosphere, weathering, or special conditions which subject the rope to either acid or alkaline substances.

That method is . . . *thorough lubrication.*

A recent and good illustration of such protective practice is found in the automotive industry. When car makers turned their plants into war production centers they ripped out massive automobile dies and machines worth millions, carted them to parking lots for the duration. When peace comes, back to work they will go.

Meanwhile these machines and dies are being protected against corrosion by a *thick coating of grease.*

Wire ropes, too, are machines. When in use (and more so when inactive) their parts need the protection good lubrication gives. Only when protected by lubrication (which retards corrosion) will they give the best possible service. Today, when we must all conserve what we have, such protection is doubly important.

Corrosion starts as soon as wires and strands are exposed to the elements and usually starts before one is aware of it.

In its early stages, corrosion is difficult to detect. The first signs are general discoloration of the wires of the rope. As corrosion progresses, the wires will become either pitted or covered with a reddish brown substance depending upon whether the corrosion is of an acid or alkaline type.

To prevent such destruction... LUBRICATE

Destruction came to these wire ropes much too soon. It might have been prevented. At an early inspection periodic lubrication would have added countless hours to the service life of these ropes.

Ⓐ *This sample,* in addition to showing evidence of wear, is very badly corroded due to having been subjected to corroding conditions of an alkaline nature.

Ⓑ *Lack of lubrication* caused the wires in this rope to become rust-bound. Fractures of this character occur when suddenly picking up the load or when the rope is flexed over the sheave, because the rust-bound wires cannot properly slide by each other. Notice the wires show very little evidence of wear.

NO. 632

Curb Corrosion and Conserve Steel

Corrosion is like an incurable disease which creeps up on a person gradually. You may check the damage it is doing, but you can never repair the damage done. Eventually it leads to early death of a rope whose service life could have been so much longer . . . with ordinary care.

Today corrosion is a very real enemy, destroying vital material (steel) needed for victory. If you inspect your ropes regularly, and apply lubricants freely, frequently, you are doing your bit to defeat this wire rope saboteur and get maximum service from your wire rope.

If you have further questions on corrosion (or any wire rope problems) feel free to write us about them. Simply address Macwhyte Company, 2940 Fourteenth Avenue, Kenosha, Wisconsin. Please write on your company letterhead.

MONARCH
Whyte Strand
PRE-FORMED
WIRE ROPE

Macwhyte's premier wire rope, famous for its strength, toughness, and internal lubrication

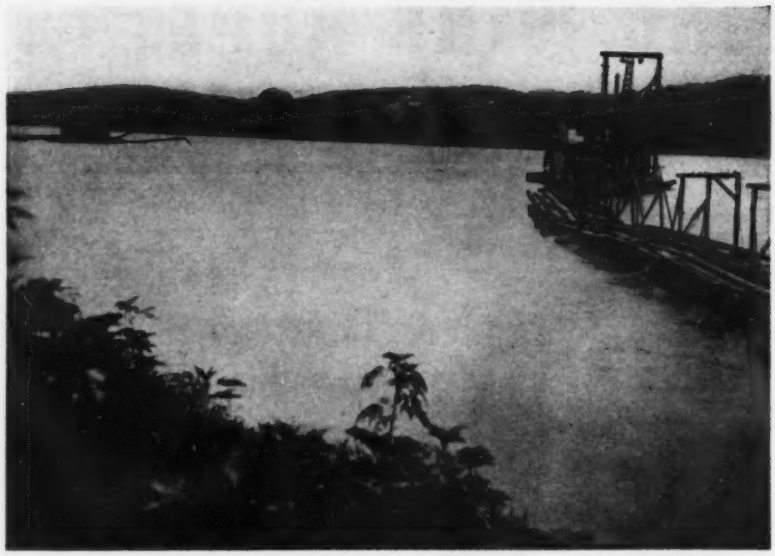
Made by

MACWHYTE COMPANY

2940 Fourteenth Avenue • Kenosha, Wisconsin

New York • Pittsburgh • Chicago
Ft. Worth • Portland • Seattle • San Francisco
Distributors throughout the U. S. A.

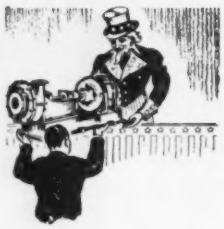
Macwhyte Company Manufactures:
MACWHYTE PREformed and Internally Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable
MACWHYTE Braided Wire Rope Slings
MACWHYTE Cables, Tie Rods, Terminals, for Aircraft



Dredges that actually seem to breed!

In more than one location, a progressive sand and gravel producer installs a Morris Hydraulic Dredge with peculiar results. A short time later, a second Morris Dredge appears at work on another deposit operated by a fellow producer nearby. Then a third, and a fourth, and additional Morris Dredges in rapid succession, all working within sight of each other on different deposits owned by different producers.

The reason? It's obvious. Morris Dredges operate with such exceptional speed and economy that when one of these money-makers is put to work, the news of its performance quickly spreads throughout the district. That's why Morris Dredges actually seem to breed!

WE HAVE ENLISTED  "FOR THE DURATION"

We have placed at the disposal of the Government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

MORRIS MACHINE WORKS — MORRIS ESTABLISHED 1864 — BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

designs, and indicates the number and size of terminals for various capacity breakers.—*Roller-Smith Co., Bethlehem, Pa.*

Lock Nuts—A comprehensive folder on An-cor-lox lock nuts has just been issued by the Laminated Shim Co., Inc. The folder fully describes the company's products, and is filled with diagrams, photographs and factual matter on An-cor-lox styles, materials, designs and finishes.—*An-cor-lox Division, Laminated Shim Co., Inc., 86 Union St., Glenbrook, Conn.*

Steel Flooring—An informative folder on open steel flooring and steps has just been published by Kerlow Steel Flooring Co. The folder concisely describes the principal patterns of gratings and their applications, includes a tabulation of safe loads for various sizes, weights and lengths of this type of flooring, and explains details of construction and methods of installation.—*Kerlow Steel Flooring Co., 21 Mallory Ave., Jersey City, N. J.*

Electric Products—The new condensed Catalog 426, superseding previous issues, has been issued by the Bull Dog Electric Products Co., and contains a set of discount sheets applying to the new catalog and a handy reference numerical index and price list applying to the Safety Switch Line. The chief change in this new catalog is the elimination of certain items which were dropped in the interest of simplification and the conservation of critical war materials.—*Bull Dog Electric Products Co., 7610 Jos. Campau Ave., Detroit, Mich.*

Pocket Catalog—Something new in catalogs, intended for the man on the job, is the handy Burndy Pocket Catalog just issued. Contained in this catalog are large, clear drawings and illustrations of 75 electrical connector types with their when, where and how-to-use features; also catalog listings and partial listings of important connector sizes. A full page of helpful wiring data and many other important features all help to make this catalog a useful piece of information.—*Burndy Engineering Co., Inc., 450 E. 133rd St., New York, N. Y.*

Testing—A handsomely printed catalog on testing water meters, why they are tested and how they are tested, has been issued by the Ford Meter Box Co. Continued interest in this vital phase of water supply and recent developments in the science of meter testing have convinced the company that another book on the subject will be worthwhile, as was the first, issued in 1936 by the same organization.—*Ford Meter Box Co., Wabash, Ind.*

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with plenty of what it takes for quick, decisive Victory, requires that every addition to America's vital transportation system be completed in record time . . . calls for road-building equipment engineered to make every minute count.

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● Your best bet for fast, accurate rolling of airports and strategic highways is the Austin-Western Tandem. Better visibility, more convenient controls, less frame overhang, and effortless hydraulic steer permit closer, faster work. Variable weight and smooth power provide accurate operation to meet the widest variety of rolling requirements. A-W Tandems change direction — forward or backward — with a vibrationless smoothness that means a better job and less wear on the machine itself. A low center of gravity prevents side sway.

A-W variable weight Tandem Rollers in 5 to 8 ton and 8 to 10½-ton sizes are available for vital construction operations. Write for complete details on construction features and operating advantages.

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ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

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Today, more than ever—the big job of the Carey representative is *serving* industry. His time for the duration is dedicated to helping you attain utmost economy in plant maintenance—top efficiency in plant operation.

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Capitalize this Carey service when our representative calls on you. Whatever your needs, you'll find that he will do everything humanly possible to be of real help in analyzing your problems and in finding the economical answers. For details address Dept. 30.

Carey PRODUCTS INCLUDE:
BUILT-UP ROOFINGS • ROOF COATINGS
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Dependable Products Since 1873
Lockland, Cincinnati, Ohio
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MEN AND JOBS

L. M. Morgan, district engineer Division 10, at Burnsville, N. C., for the North Carolina State Highway and Public Works Commission, has resigned his position to accept other employment. Mr. Morgan has not announced his future plans.

Recent changes in the personnel of the Maumelle Ordnance Plant, Little Rock, Ark., are as follows: **Maj. H. S. Bronson,** area engineer and **Capt. G. M. Donaldson,** executive officer, have been transferred to the Corps of Engineers office at Indiantown, Pa. **Capt. Arthur L. Anderson,** property officer, has been transferred to the Little Rock district of the Corps of Engineers. **Capt. Henry G. Pedri** will succeed Maj. Bronson and Capt. Donaldson in their former positions and he will be assisted by **Lt. Henry W. Snyder.**

W. L. Jewell of Sanford, N. C. is now engaged in supervising construction operations for the conversion of a dirigible hangar at Fort Bragg, N. C. into barracks to house 600 men.

Chris J. Sherlock, former director of the Alabama Highway Department, and at present head of the American Road Builders Association, has received a commission as major in the Corps of Engineers, and has been ordered to report to Baltimore. Mr. Sherlock served overseas in World War I.

Walter B. Jones, Alabama conservation director, has been recalled to service as a lieutenant-colonel in the Corps of Engineers. He reported for service on June 20. **Albert Gill** of Mobile, will fill Mr. Jones' position during his absence.

Charles Rudd, railroad relations engineer for the South Dakota State Highway Commission, has been ordered to report for active duty as a major in the U. S. Army. Mr. Rudd reported on June 27 for duty at Ft. Logan, Colo.

Boris W. Boguslavsky was recently appointed as an assistant professor in structural engineering at the University of Akron, Akron, Ohio.

William E. Pettitt, formerly with the Corps of Engineers in the office of the Chief of Engineers at Washington, D. C., has become associate construction engineer with the Federal Works Agency at Williamsburg, Va.

Jacob T. Wankmuller, formerly sanitary engineer with the health department of the city of New York, has resigned to accept a position as construction engi-

neer, Federal Works Agency. He has been assigned to the Chickahominey water supply for Langley Field, Fort Monroe and the City of Newport News.

Lieut. Col. B. F. Vandervoort, formerly district engineer at Columbus, Ohio, has been named district engineer at Cincinnati.

Maj. William Kenneth Dickson, a civil engineer of Charlotte, N. C., before reentering army service, has been assigned as Quartermaster at Fort Bragg, N. C.

C. H. Wainwright has been commissioned a First Lieutenant in the Corps of Engineers and assigned as assistant post engineer at Fort Worden, Wash.

Lieut. Col. George W. Semmes of Jacksonville, Fla., has been commissioned in the Corps of Engineers and attached to the port engineer's office at San Francisco.

S. W. St. Clair, of Miami, has been transferred from the Atlanta regional office of the Federal Works Agency to the agency's construction office at Starke, Fla.

John J. Lucas, civil engineer in the Cleveland, Ohio, city water division, resigned recently to enter military service.

W. W. Slaton, formerly highway engineer for St. Clair county, Ashville, Ala., has resigned to become superintendent of utilities at the Anniston Ordnance Depot, Anniston, Ala.

C. O. Markson, engineer on highway construction for the P. C. Roth Construction Co. of Brainard, Minn., has gone to Wyoming to act as chief engineer on a defense project there.

William R. Shelton, of Raleigh, has been commissioned a second lieutenant in the Corps of Engineers and stationed at Camp Gruber, Okla.

George D. Anderson is now chief engineer on a project sponsored by the American and Canadian governments at Whitehorse, Yukon, Canada.

Lieut. Col. L. Stuart Vance, former chief engineer and superintendent of the Louisville, Ky. Water Co., has been named supply officer for the Southeast Army Air Forces Training Center at Maxwell Field, Ala.

Marion Hageman has assumed the duties of city engineer at St. Marys, Ohio.

John Boswell Whitehead, director of the school of engineering of Johns Hopkins

Efficient Long-Lived Dippers

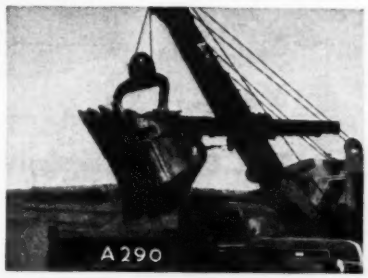
Essential to Fast War-Time Construction...

The power shovel leads the van in much of our war effort. In building new camps, air fields, naval bases and munitions plants, dredging harbors and drydocks, and in a wide range of aviation, military and naval construction projects, other operations *follow the dipper.* It's in there first—digging away!

If it's an Amsco Manganese Steel dipper on a fast, hard-hitting shovel, it will speed up the job all along the line, for dippers made from "the toughest steel known" wear longer and require fewer repairs. Today any thing that saves time and manpower brings victory nearer.

The longer wear, the reduction in delays and costly replacements resulting from the use of 13% manganese steel; and the full, fast loading and clean dumping assured by effective dipper design guarantee more continuous and productive power-shovel operation.

In addition to other factors of design aiding continuous service, a worn lip on an Amsco Renewable Lip Dipper can be replaced in minutes instead of hours.



An Amsco 1½ yard Renewable Lip Dipper on one of 24 Lima Shovels that made the dirt fly in the construction of the Umatilla Ordnance Depot. Over 1000 reinforced concrete buildings, 26½ ft. wide and 80 ft. long, were constructed for storing munitions, and scores of wooden buildings for housing. Miles of roads put down; hundreds of acres of leveling. (A290).

Amsco Renewable Lip Dippers, mounted on Thew-Lorain power shovels, played an important part in the excavation of 4,000,000 cubic yards of earth for the construction of Paine Field. This rugged, yet light and speedy dipper kept a fleet of dump trucks busy in handling the bulk of the work involved in this earth moving contract (A291).

This 4½ yard Dredge Dipper with renewable mud lip and double door (C-506) was made for dredging an Atlantic harbor. The mud lip is replaced by a rock lip with Vanderhoef teeth when digging conditions demand.

Bulletin 641-D pictures the various types of Amsco Power Shovel Dippers and explains the manifold advantages of 13% manganese steel.

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OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Manganese Steel Castings for shocks and abrasion.
Chromium-Nickel-Alloy Castings for heat and corrosion resistance.
Power Shovel Dippers, Dredge and Industrial Pumps.
Welding Materials for reclamation and hard-surfacing.

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STANLEY HARDWARE
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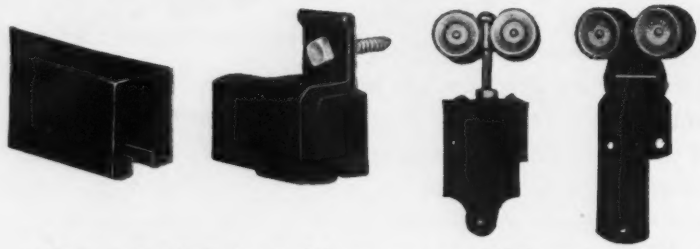
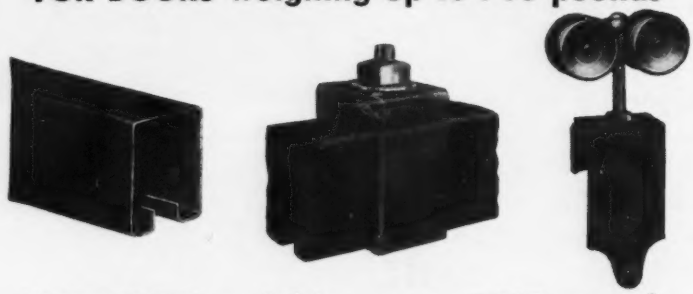
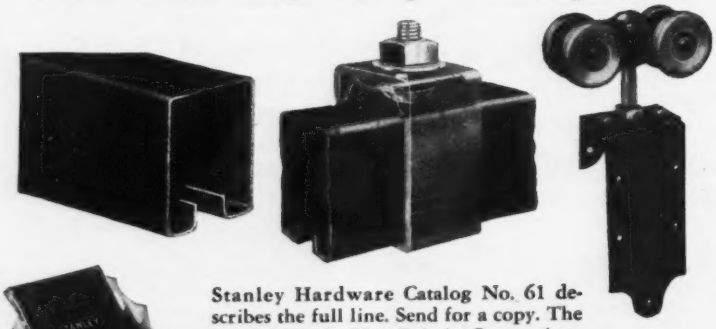


FOR DOORS weighing up to 700 pounds



FOR DOORS weighing up to 1000 pounds



Stanley Hardware Catalog No. 61 describes the full line. Send for a copy. The Stanley Works, New Britain, Connecticut.

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Bailey Meter Co. Ltd., Montreal, Canada

University, will become professor emeritus Aug. 31 when he reaches the retirement age.

Capt. Henry S. Brooks of Oxford, N. C., formerly resident engineer at Fort Myers, Ga., recently was named area engineer in charge of construction of a new army air base in Florida.

John Furman Tribble, research engineer and acting materials engineer, left the Alabama highway department July 1 to become chief construction engineer for the firm of Goodwin & Van Keuren, on construction of a flying school at Courtland, Ala.

Lieut. Col. John R. Crume, Jr., executive officer for the Corps of Engineers at Little Rock, Ark., since 1940, has been assigned to combat duty at Fort Leavenworth, Kan.

Lieut. William C. Gibson, sanitary engineer, has reported for duty with the Sanitary Corps, U. S. Army, at Key Field, Meridian, Miss.

W. B. Ferguson has been promoted from resident engineer to district engineer in Division 10, Burnsville, N. C., by the North Carolina State Highway and Public Works Commission.

Paul Gerhardt, Jr., city architect for Chicago, has been appointed commissioner of buildings for the city, succeeding **Richard E. Schmidt,** who retires soon.

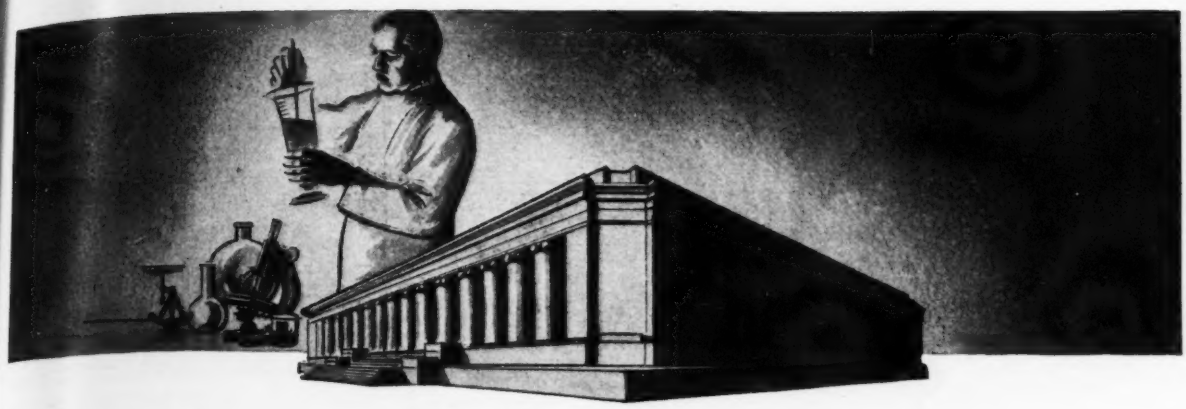
Capt. G. L. Stephens of Ottawa, Ont., chief of engineering and construction for the Royal Canadian Navy, officiated at keel laying of two ships near Halifax, recently.

Roy P. Bishop, civil engineer and former director of public safety at Durham, N. C., has been promoted from the rank of captain to that of major in the 727th Military Police Battalion at Camp Forest, Tenn.

Frank W. Cawthon, former resident engineer at Dallas for the Texas state highway department, has been promoted to the rank of lieutenant colonel in the Army Air Forces.

R. M. Hardy, a member of the Department of Civil Engineering at the University of Alberta, Canada, has taken employment in Montreal for the summer months with the general engineering department of the Aluminum Co. of Canada, Ltd.

J. W. Taylor, engineer in charge of construction of the North Unit Canal of the Deschutes project, has been called



Research....

KEYSTONE OF

PITTSBURGH-DES MOINES' PROGRESS

The program of engineering research maintained by the Pittsburgh-Des Moines Steel Company over the years, now culminates in the establishment of a Multiple Fellowship on Chemical Containers and Storage at the Mellon Institute of Industrial Research.

Utilizing the unlimited scientific resources of the Institute, the Fellowship will conduct research on the problems connected with bulk storage of chemical substances, including water, oils, and gases.

At the present time, the Fellowship is working on vital problems connected with the storage of chemicals in the synthetic rubber industry, including butadiene, styrene, acrylonitrile, and isobutylene.

The general research conducted by the Pittsburgh-Des Moines Chemical Storage Fellowship will develop much new chemical and physical data available to our clients, in the form of reports and recommendations as to the most suitable types of containers, construction, temperatures, pressures, linings and coatings for the protection of the container and the substances for which bulk storage facilities are desired.

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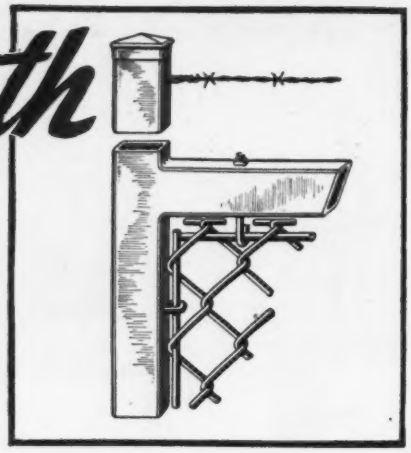
Strength



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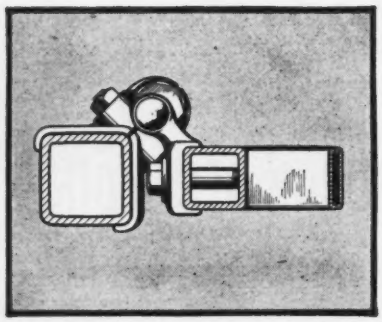
Anchor Square Frame Gates

. . . always swing freely, latch easily, look more attractive, even after years of service. *Exclusive* Anchor construction of strong, 2-inch square steel tubing, inseparably butt-welded at *all* corners, provides amazing rigidity, freedom from sagging, warping. The fabric is firmly held by rounded steel tension rods. Single and Double types. Find out how Anchor Gates, and other exclusive Anchor features provide extra protection, durability, low maintenance cost. Write for Anchor Fence Industrial Catalog, and name of nearest Anchor Fence Engineer. ANCHOR POST FENCE CO., 6665 Eastern Avenue, Baltimore, Md.



Special Hinges permit 180° swing. Can be adjusted to open either in or out. Clamp to the gate. No holes to weaken the gate structure or to admit moisture.

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Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.

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STEAM TURBINES . . . HELICAL and WORM GEARS . . . PUMPS: Centrifugal, Propeller, Clogless, Mixed Flow, Rotary Oil . . . Pump Priming Systems . . . CENTRIFUGAL BLOWERS and COMPRESSORS.

to service in the Corps of Engineers.

Robert A. Cunningham has joined the staff of E. G. M. Cape and Co. at St. Johns, Newfoundland.

J. A. Ellis has been appointed engineer of track for the Canadian National Railways at Montreal.

Edward M. Beardslee, Atlanta, Ga., civil engineer and architect, has been appointed city manager of DeLand, Fla.

G. W. Griffin has recently been appointed secretary-treasurer of the St. Johns branch of the Engineering Institute of Canada. Mr. Griffin is assistant engineer of the Canadian Pacific Railway at St. John.

Glen Kirkman, Monroe county, Ohio, engineer, has accepted a position as engineer on the construction of naval bases in the Caribbean.

B. O. Stewart has been appointed engineer of bridges with the Canadian National Railways at Montreal. He was formerly assistant engineer of standards for the company.

J. H. Wright, engineer of specifications for the Mississippi state highway department, has reported to Camp Claiborne, La., for active service, with the rank of captain in the Corps of Engineers.

Capt. Merile H. Stevenson, U. S. Marine Corps, who has been serving as WPA supervisor of the Key Field airport project near Meridian, Miss., has been called to active service.

William W. Dillard, Jr., associate engineer at the Radford Ordnance Works, Radford, Va., has become a first lieutenant in the Corps of Engineers, in charge of field operations of the Ordnance plant.

F. D. Loveland, of Denver, Colo., formerly located at Lowry Field, has been named area engineer at Buckley Field.

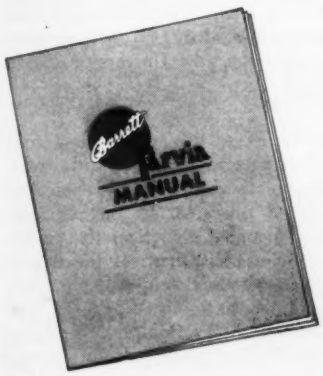
Lieut. Col. Mark Harned, formerly area engineer at Lowry Field, Denver, is now acting as executive officer for District Engineer Carl H. Jabelonsky at the district headquarters in Denver.

A. J. Thomas, for six years resident engineer at Colville, Wash., for the Bureau of Reclamation, has resigned to engage in construction of the Alaska highway at White Horse, B. C.

John Bell has been named manager of the city water plant at Tarboro, N. C., succeeding **W. D. Bryan, Jr.,** who recently entered army service.

AMERICA'S ROADS
MUST BE KEPT IN FIGHTING TRIM, TOO!

"Stitch-in-time" road work is especially economical and necessary today. A comprehensive program of maintenance and repair will keep your highways in fighting trim for the duration.



America's all-out Victory Program demands 100 per cent performance from every turret lathe and drill press turning out the munitions of war.

It demands equal performance from every link in our vast transportation system. Strategic cross-continent highways and vital feeder roads must be kept in top condition to assure the mobility of a nation that goes to war on wheels.

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Let the Tarvia* field man help you. He can show you how a Tarvia maintenance and repair program can stretch your highway dollar to do *more* of the things required of it. Tarvia is a truly universal paving material—proved by nearly 40 years of service for road-building, maintenance or repair.

Send for the free new Tarvia manual. Its 64 pages, profusely illustrated, show how you can use Tarvia, not only to build new highways, but also — and more important — to extend the life and usefulness of existing roads. Phone, wire or write our nearest office.

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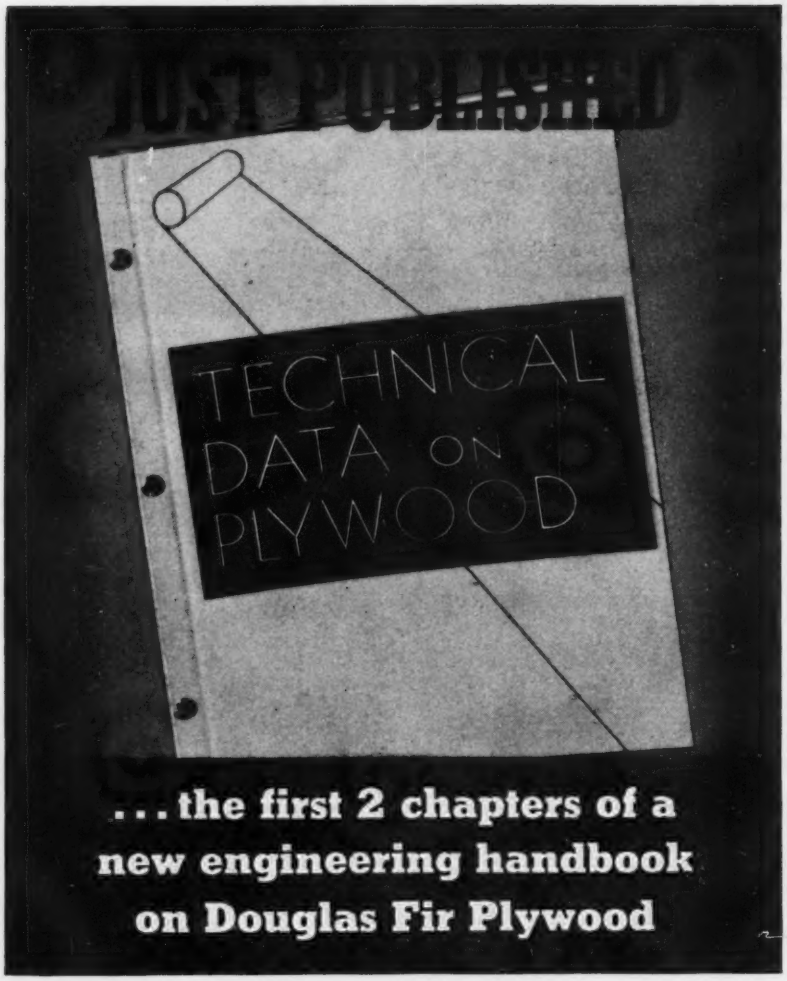

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This handbook also contains the new U. S. Commercial Standards for Douglas Fir Plywood, CS45-42, established in cooperation with the National Bureau of Standards. It describes the revised types and grades of Douglas Fir Plywood in detail and tells you how to use them.

Write now for your free copy of *"Technical Data on Plywood."* It is in loose-leaf form, and you will be sent additional chapters as they are published. Douglas Fir Plywood Association, Tacoma Bldg., Tacoma, Washington.

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MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

"A PRODUCT OF AMERICA'S ETERNALLY REPLENISHING FORESTS"

MEETINGS

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual convention, University of Minnesota, Minneapolis, Minn., July 22-23.

REGIONAL AND LOCAL MEETINGS

PENNSYLVANIA SEWAGE WORKS ASSOCIATION, annual conference, Carlisle Sewage treatment Plant, Carlisle, Pa., and Penn-Harris Hotel, Harrisburg, Pa., August 25-26.

PENNSYLVANIA WATER WORKS OPERATORS' ASSOCIATION, annual meeting, Penn-Harris Hotel, Harrisburg, Pa., August 27.

LEAGUE OF NORTH DAKOTA MUNICIPALITIES, annual meeting, Dickinson, N. D., Sept. 14-16.

NORTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, 14th annual convention, Williston, N. D., Sept. 17-19.

Elections and Activities

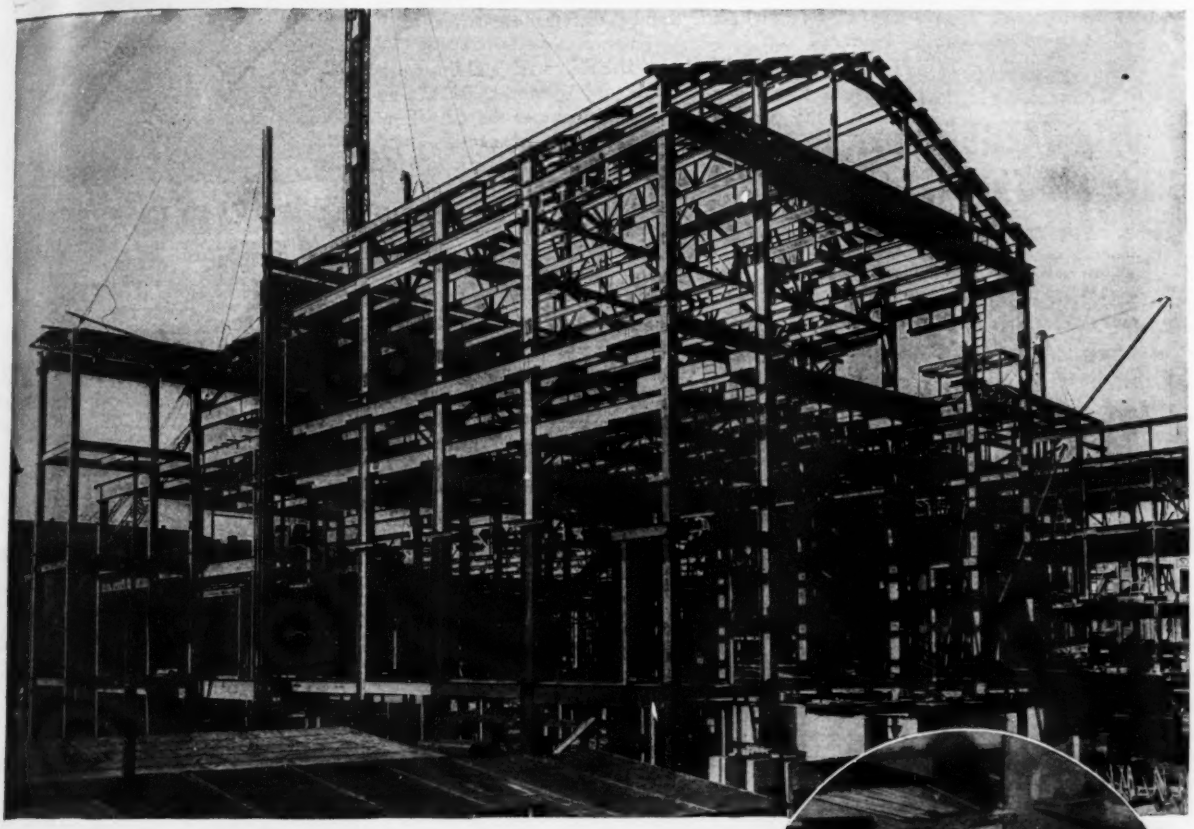
FRED G. GORDON, senior filtration engineer for the City of Chicago, has been elected president of the Western Society of Engineers. C. Earl Webb, division engineer for the American Bridge Co., becomes first vice president; P. R. Elfstrom, assistant chief engineer for the Chicago, North Shore and Milwaukee, becomes second vice president, and T. G. LeClair, supervising development engineer for the Commonwealth-Edison Co., becomes treasurer.

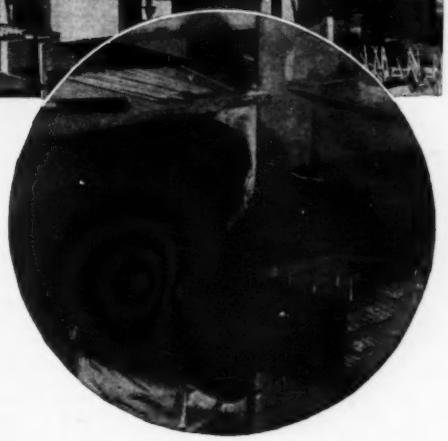
AT A meeting of the Nashville Section, American Society of Civil Engineers, F. L. Castleman, professor of civil engineering at Vanderbilt University, announced his resignation as secretary-treasurer of the society. Professor Castleman left Vanderbilt University to become professor and head of the civil engineering department of the University of Connecticut.

OWEN W. ELLIS, director of the department of engineering and metallurgy of the Ontario Research Foundation, has been elected president of the Affiliated Engineering and Allied Societies in Ontario. Prof. E. A. Allcut, of the department of mechanical engineering, University of Toronto, was elected vice president, and R. C. Poulter, director of education, Radio College of Canada, was re-elected secretary-treasurer. The affiliation serves to coordinate the activities of

WHEN YOU BUILD WITH STEEL

Welded Construction *Saves* Material and Time





Less steel is needed when structures are welded, first because welded construction reduces or entirely eliminates overlapping of metal at the joints and second, because welding utilizes the full section of truss members. Besides saving vital materials for other important victory needs, welding speeds up erection time by eliminating drilling and punching operations and by reducing shop handling of heavy pieces. Structures which have been joined by welding are smooth of surface, are easy to clean and to paint. Less area is exposed to corrosion.

If your company is engaged in war construction and has any problem involving the use of the electric arc or the oxyacetylene flame, the services of our Applied Engineering Department are at your disposal.

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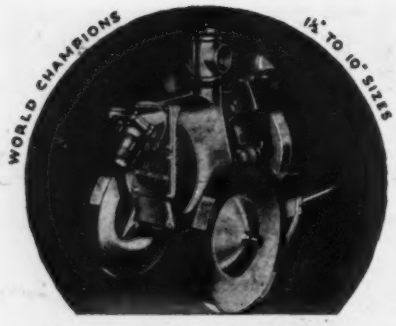

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SMOOTH CARRY .
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the many engineering societies represented in the Toronto and Hamilton areas.

W. A. Bugge, Jefferson county engineer at Port Townsend, Wash., has been elected president of the Washington State Association of County Engineers. R. P. Ryker of Okanogan county was named vice president and R. E. Woodward, Pacific county, secretary-treasurer.

William H. Roberts, public works commissioner of Rochester, N. Y., has been elected president of the City Engineers Association.

The Montana Society of Engineers has elected W. A. O'Kelly of Butte as president; C. A. Lemmon, Anaconda, vice president; A. I. Hoem, Butte, second vice president; F. D. Schwanz, Butte, secretary-treasurer; A. E. Koenig and George Moser, both of Butte, trustees.

Members of the South Carolina Society of Engineers and the South Carolina Section of the American Society of Civil Engineers held a one-day meeting at Columbia recently. Speakers included C. J. Corliss, manager of the public section, Association of American Railroads; Maj. G. Howard Mahon, director of the South Carolina council for national defense; Mayor Fred Marshall of Columbia, and Gov. R. M. Jeffries.

E. R. Stapley, acting dean of the division of engineering at Oklahoma A. and M. College, has been given the George W. Fuller award for the Southwest district of the American Water Works Association.

The Canton, Ohio, Regional Society of Professional Engineers and Surveyors held its final meeting recently at Canton. Henry W. Harter spoke on organization of civilian defense work.

F. P. Vaughan, of St. John, N. B., has been awarded a life membership in the Engineering Institute of Canada.

Ernest P. Goodrich, New York, addressed the San Francisco Section of the American Society of Civil Engineers at a recent meeting on the subject of "Scientific Approaches to City Planning." Mr. Goodrich is frequently in San Francisco as consultant on traffic problems to the city planning commission.

The Texas Highway Branch of the Associated General Contractors recently organized in Dallas by electing Dean Word, as president, and R. B. Smith, vice president.

E. M. Duesenberg, George C. Koss and W. F. Kucharo have been named to conduct the affairs of the Central Branch in Iowa of the Associated General Contractors.

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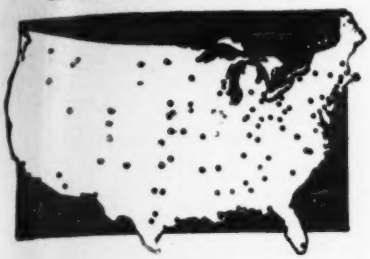
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges, Grade Cross'gs	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

†Ga., Augusta—City, waterworks imprvs. $20,000. **FWA.**

Kan., Russell—R. E. Boxberger, city clk., spillway, $50,000.

†La., New Orleans—City, R. O. Maestri, mayor, water extens., La. 16-233. $317,200. **FWA.**

★**†Me., Portland** — Portland Water Dist., F. J. Reny, mgr., Casco St., watermains, ME 17-124. $985,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, engr. CD 7/6—ENR 7/9.

†Md., Eastport—Town, waterworks imprvs., watermain, $18,000. **FWA.**

Mo., Neosho—Voted $100,000 bonds, water sys. $252,535. Plan FWA participation. H. T Lawrence, 3244 N.W. 14 St., Oklahoma City, Okla., engrs. CD 10/1—ENR 10/9.

★**†Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, wells, piping, water storage and treatment plant. Over $1,000,000.

Pa., Scranton—Scranton-Spring Brook Water Service Co., 17 Broad St., exten. watermains, East End area. $20,000.

†Tex., San Antonio—Waterworks Bd., W. D. Masterson, engr., water imprvs., Tex. 41-406. $125,000. **FWA.** CD 10/29—ENR 11/6.

Wash., Pasco—D. W. McGhee, city water mgr., water filtration plant. $100,000. J. G. Cunningham, Spalding Bldg., Portland, engr.

B. C., Haney—H. M. Davenport, town clk., water sys., for Maple Ridge Municipality, $38,000.

B. C., Royal Oak—Municipality, wood stave water tank, etc. $29,000.

Ont., Watford—Municipality, c/o W. B. Fuller, clk., reservoir, 4 in. mains. $30,000. Pub. Utilities Comn., Town Hall, engrs.

BIDS ASKED

Bids Asked July 30

Md., Towson—Comrs. Baltimore Co., 11,130 lin. ft. 6- to 12-in. c.i. watermains, Dundalk, Contr. 61 W; 16,350 lin. ft. 6- to 10-in. vitr. sewers, Gray Manor, Contr. 62 S.

Pa., Rouseville—G. H. Brush, boro secy., 1,700 ft. 6 in. water line, also 1,500 ft. transite pipe. $15,000. Hill & Hill, 24½ Main St., North East, engrs. CD 11/10.

Bids Asked July 27

Va., Norfolk—City at office W. H. Taylor, III dir. P. Wks., City Hall, water diversion tunnel between Lake Burnt Mills and Lake Prince; adv. ENR 7/16.

Bids Asked July 28

†Okla., Tulsa—At office City Auditor, City Hall, waterworks, Okla. 34-101, Contr. 1. $150,000. **FWA.** Plans deposit $15. W. F. McMurray, City Hall, engr.

Bids Asked August 5

Mich., Detroit—Bd. Water Comrs., Water Board Bldg., 735 Randolph St., Detroit, 48 in. watermain, Meyers Rd. from West Chicago to Grand River, and Meyers Rd. from Grand River Ave. to Fenkell Ave., Docket Mich 20-185. Plans deposit $10 ea., adv. ENR 7/16.

Bids Asked

†New Mexico—U. S. Eng., Albuquerque, wells.

LOW BIDDERS

Calif., Pittsburgh—City, July 6, water sys. exten., c.i. pipe, fittings, etc., from Conner & Brant, 1222 Whipple Ave., Redwood City, Calif. **$37,731.**

†Nevada—U. S. Eng., Wright Bldg., Sacramento, Calif., July 6, water supply sys. from MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco, Calif., **$94,749.**

O., Medina—Village, June 27, imprv, WW, from Freeman & Jones, Inc., 5716 Euclid Ave., Cleveland. **$21,500.** CD 6/23.

CONTRACTS AWARDED

†California—U. S. Eng., 74 New Montgomery St., San Francisco, water well drilling, to N. F. Keyt, P. O. Box 24, Cotati. Est. over **$15,000.** Awarded 7/9.

★**†Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, water supply and distr. sys., Inv. Jax-42-146, to W. Co. Shepherd, 2450 Briarcliff Rd. N.E., Atlanta, Ga., less than **$1,000,000.** Awarded 7/3.

†Ga., Moultrie—U. S. Eng., Courthouse and Postoffice, Jacksonville, waterworks imprvs., to Ivy H. Smith, 1525 San Mario Blvd., Jacksonville, Fla.

Louisiana—Industrial Company, addnl. work on water lines, to Boh Bros. Constr. Co., 2400 Cypress St., New Orleans. J. G. White Eng. Corp., Hibernia Bldg., New Orleans, engrs

★**†Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., filtration plant, to Cummins Constr. Corp., 803 Cathedral St., Baltimore. Est. less than **$500,000.**

N. H., North Conway—Town, F. E. Littlefield, underground chlorinator houses, to W. H. Duprey, North Conway. Est. over **$15,000.** CD 5/18—ENR 5/21.

O., Warren — Temporary water filters, etc., to Harries & Bowers, Warren-Burton Rd., **$30,334.** Bids 6/3. CD 5/26—ENR 5/28.

O., Woodville—Village, imprv. water softening plant, to A. D. Zaebst Ada, **$19,500.** CD 2/2—ENR 2/5.

†Texas—U. S. Eng., Masonic Bldg., Amarillo, water pump sta., AE-API-18, to Panhandle-Sira-Dalton Co. 3901 Elm St., Dallas, **$119,600.** Bids 6/22. CD 6/18.

†Texas—U. S. Eng., 231 W. Main St., Denison, 250,000 gal. tank, No. 257-42-221, to Standard Paving Co., Majestic Bldg., Fort Worth, approx. **$58,000.**

†Texas—U. S. Eng., Federal Bldg., Galveston, drilling, casing, developing deep water wells, to Layne-Texas Co., Ltd., 6931 Harrisburg Bldg., Houston, **$36,000.**

†Texas—U. S. Eng., Fort Sam Houston, 250 gal. elevated water tank, Spec. 42-112, to Valco, Inc., M & M Bldg., Houston, **$33,000.** Bids about 6/18.

†Texas—U. S. Eng., Fort Sam Houston, drilling, casing, developing water wells, Spec. 42-149, to Wm. Cravens & Sons, 501 Hays St., San Antonio, **$19,600.** Bids 7/9. CD 7/3.

†Tex., Galveston—B. Harris, mayor, Contr. 6, 2 reservoirs, Tex. 41-133, to J. W. Zempter Contg. Co., 2115 Church St. **$95,175.** CD 7/2—ENR 7/9, under LB.

†Tex., Grand Prairie—G. H. Turner, mayor, Contr. 2, water and sewer imprvs., Tex. 41-373, to W. G. Cullum & Co., Great Natl. Life Bldg., Dallas. **$51,000.** Est. $55,000. **FWA.** CD 5/25.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, outside water lines, to Armco Railroad Sales Co., Middleton, O. Bids 6/30. CD 6/26.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, installing outside waterlines, to Armco Railroad Sales Co., Middletown, O.

B. C., Patricia Bay—Dpt. National Defense for Air, Ottawa, Ont. water supply and distr. sys. at R.C.A.F. Station, to Carter-Halls-Aldinger Co. Ltd., 670 Taylor St., Vancouver, **$325,000.**

N. B., St. John—Nat. Harbor Bd., Ottawa, Ont., new water connection on West St. John Docks, to City of John, City Hall, **$16,000.** A. Gray, Harbor Bd., St. John, engr.

Ont., New Toronto—Municipality, New Toronto & Public Utilities Comn., E. W. Grant, chn., watermains, to Mohan Constr. Co., Ltd., 9 Pharmacy Ave., about **$18,000.**

Ont., Preston—Water & Light Bd., F. Pelz, mgr., Preston, addnl. water wells, to International Water Supply Co., 12 Maitland St., London. Est. **$25,000.** Awarded 7/7. CD 6/29—ENR 7/2.

Que., Cap de la Madeleine—F. Beaumier, municipality clk., WW imprvs., reservoir, artesian wells, etc., day labor. **$170,000.** J. E. Fleury, Town Hall, engr. CD 7/10.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Mo., Pattonville—Pattonville Sanitary Sewer Dist., c/o Everett C. Meyers, engr., 7545 Ellis Ave., Maplewood, sanitary sewerage sys. Over $25,000.

Pa., Franklin—J. G. Bohlender, mayor, connection between Rocky Grove and Franklin municipal sewage disposal plants. $25,000. J. Snow, city engr.

†Tenn., Knoxville — Tennessee Valley Auth., Knoxville, elevating 18 sewer outlets to be submerged when dam is completed. $500,000.

†Texas—Tri-City Fresh Water Sup. Dist. 2, c/o E. Platt, mgr., Baytown, change in scope elimination sewage disposal plant, Harris Co., Tex. 41-287-F. $50,000. **FWA.** C. H. Kelly, Baytown, engr.

Tex., San Antonio—Bexar Co. Water Imprvt. Dist. 8, c/o C. W. Fenstermaker, San Antonio, bond election Aug. 1, sewage collecting lines in Terrell Hill Sect. $50,000.

★**Ont., London**—Intercepting sewers. $500,000. R. Garrett, City Hall, engr.

Que., Cap de la Madeleine—F. Beaumier, city clk., bids soon, 10,000 lin. ft. 24- to 36-in. sewers. $75,000. J. E. Fleury, c/o owner, engr.

BIDS ASKED

Bids Asked August 10

Calif., Salinas—Alisal Sanitary Bd., 730 E. Market St., sewer collecting sys., near here. Plans deposit $10. C. C. Kennedy, 604 Mission St., San Francisco, engr.

Bids Asked

†Texas—U. S. Eng., Federal Bldg., Galveston, 27,000 lin. ft. storm sewers. $70,000. Plans deposit $50.

†Tex., El Paso—City, outfall sewer, sewer and sewerage facilities, Tex. 41-123. $495,700. **FWA.** Headman & Ferguson & Carollo, Home builders Bldg., Phoenix, Ariz., engrs. CD 5/19—ENR 5/21.

LOW BIDDERS

Calif., San Bernardino—Bd. Water Comrs., City Hall, July 8, sewage treatment plant,

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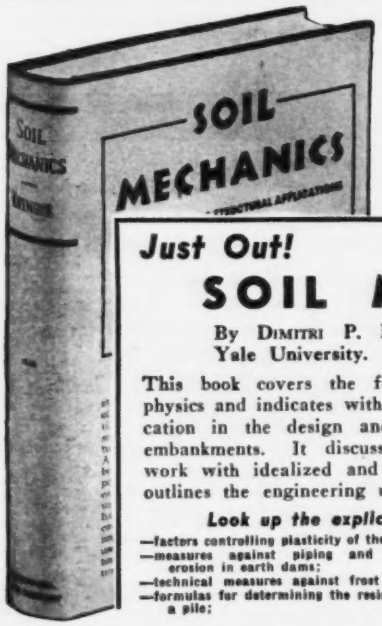

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SEWERS, etc. (Low Bidders, Cont'd.) from General Constr. Co. & J. W. Johnson, 5205 Hollywood Blvd., Los Angeles, $369,741. CD 6/23—ENR 6/25.

†**Colo., Denver**—City and County of Denver, sewage disposal plant, from Harry Stenmark, 821 Humboldt St., $209,943. FWA. CD 5/28—ENR 6/4.

N. Y., Great Neck—Bd. Sewer Comrs., Great Neck, July 9, sewage treatment plant, from Spearin, Preston & Burrows, Inc., 49 Church St., New York, $221,025. CD 6/19—ENR 6/25.

CONTRACTS AWARDED

★†**Indiana**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., sewers, water distr. lines, electric lines, roadways, walks, to E. A. Mariana Co., Richmond, $566,538. Bids 6/11. CD 6/17—ENR 6/25.

†**Nevada**—Federal Works Agency, 498 S. Spring St., Los Angeles, Calif., main sewer, Docket Nev. 26-116, to Bebek & Brkich, 238 Florence Ave., Los Angeles, Calif., and Sutalo & Ramljak, 476 Camulos St., Los Angeles, Calif. $237,791. Bids 7/1, awarded 7/9. CD 7/6.

O., Port Clinton—Village, 23,300 ft. 6- to 15-in. sewers, to Verderber Bros., 4511 Secor Ave., Toledo, $66,590, bids 5/12, CD 4/27—ENR 4/30; 16,000 ft. 6- to 30-in. sanitary sewers, to Del Constr. Co., 14017 Becket Rd., Shaker Heights, $94,621. Bids 6/9.

†**Texas**—U. S. Eng., Masonic Bldg., Amarillo, sewage lift stations, Apl. 155, to Panhandle-Sira-Dalton Co., 3901 Elm St., Dallas, $168,000. Est. $140,000.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, sewage treatment plant, No. 257-42-225, to J. W. Bartholomew, Construction Bldg., Dallas. $70,000.

†**Texas**—Industrial Co., sanitary and storm sewerage sys., to Tellepsen Constr. Co., 3300 Clay St., Houston. $225,000. Defense Plant Corp. will finance.

†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, water distr. lines, to Uvalde Constr. Co., Santa Fe Bldg., Dallas, $34,000.

†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, outside utilities, sewage plant, water storage, pump, unit, etc., to Parrott & Oldt, 403 Haskell St., Dallas, $80,000; sanitary sewer collecting lines, to Uvalde Constr. Co., Santa Fe Bldg., Dallas, $62,000.

†**Texas**—U. S. Eng., Fort Sam Houston, installing sanitary sewer collecting lines, disposal plant with chlorinator and appurtenant equip. and water supply and distr. sys., both Spec. 42-175, to Hays & Donathan, Southern Standard Bldg., Houston, $66,000 and $36,000 respectively. CD 7/3, under Unclassified.

Que., Quebec City—Municipality, c/o F. X. Chouinard, city clk., St. Charles River sewer, to J. A. Auclair, Gifford. $279,813. CD 3/20.

BRIDGES GRADE CROSSINGS

PROPOSED WORK

California—State Div. Hys., Sacramento, rejected bids July 1, culverts, bridges etc., Humboldt and Siskiyou Counties. C. H. Purcell, Pub. Wks. Bldg., Sacramento, engr. CD 7/6—ENR 7/9.

Ill., Chicago—Plans conversion fixed bridge over Sanitary and Ship Canal, S. Western Ave. into vertical lift bridge (suspended span 109 ft. long, 145 ft. wide to be timber decked, towers to be provided for lifting same). O. E. Merritt, comr. P. Wks. W. W. De Berard, city engr.

Ill., Vandalia — State Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, overcrossing Illinois Central R. R. tracks, FA Rt. 12, near here, Fayette Co. W. W. Polk, ch. engr.

Ia., Elma—Howard Co., Cresco, rebuilding 15 and repairing 50 bridges. $40,000.

Maryland—State Roads Comn., Baltimore, rejected bids June 30, overhead structures over Penna. R. R., Contr. H.269-1-466, Harford Co. CD 7/8, under LB. ENR 6/24, under BA.

Montana—State Hy. Comn., Helena, 453 ft., concrete, steel, treated timber bridge over Yellowstone River, Benbow Access Rd., Columbus. $111,757. H. W. Holmes, Helena, state hy. engr.

Que., Quebec City—Province of Quebec, Quebec City, reparling Island of Orleans Bridge. $38,500 voted. Dpt. P. Wks., engrs.

BIDS ASKED

Bids Asked July 20

B. C., Squamish — W. H. Tobey, genl. mgr. Pacific Great Eastern R. R., 736 Granville St, Vancouver, bridge, 2 through Howe truss spans. $50,000. C. L. Bates, Squamish, ch. engr.

Bids Asked July 24

Minnesota—State Hy. Dpt., St. Paul, Bridge 6418, 60 ft. concrete deck girder over Buffalo River, Clay Co., alternate bids for Bridge

BRIDGES, etc. (Bids Asked, Cont'd.)

6416-A, old 50 ft. steel truss; Bridges 6415, 6416 and 6417, each 20 ft. concrete slab spans, S.P. 1410-05, Clay Co., alternate bids for Bridges 6415-A, 6416-A and 6417-A, 20 ft. creosoted timber spans; Bridge 6453, 24 ft. creosoted timber span over Cat Creek, Wadena Co., alternate bids for Bridges 6453-A, 6453-B and 6453-C, using steel beams; Bridge 1325, pier repairs, over Crow Wing River, Wadena Co. J. T. Ellison, ch. engr.

LOW BIDDERS

Georgia—State Hy. Dpt., W. E. Wilburn, chn., bridge over Chattahoochee River, Cobb and Fulton Counties, from G. L. Strickler, Austell, **$201,446.** Est. $200,000. Bids 7/3.

Illinois—State Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, July 10, bridge, culvert, in Sangamon and Logan Counties, from R. A. Cullinan & Son, Tremont, **$42,038.** CD 7/3.

Kentucky—Dpt. Hys., Frankfort, July 10, concrete bridge, 0.085 mi. Henderson-Morgan-field Rd., Henderson Co., from Lyons & Breeden, Rogersville, Tenn., **$72,953;** three 50 ft. concrete span, overhead bridge, 0.03 mi. Fort Knox-Garnettsville Rd., Meade Co., from F. J. Snider, Elizabethtown. **$27,162.** CD 6/23—ENR 6/25 under Roads.

CONTRACTS AWARDED

New Brunswick—Dpt. P. Wks., Fredericton, bridge, Saumerez Parish, to Diamond Const. Co. Ltd., Fredericton, **$69,000.**

★**†Oklahoma** — U. S. Eng., Citizens Bank Bldg., Denison, rein.-con. substructure 5,000 ft. bridge over Washita River, and relocation Hy. 70, to Union Constr. Co., P. B. Reis, 711 Old Colony Bldg., Des Moines, Ia., **$2,014,586.** CD 6/24—ENR 7/2.

Quebec—Province of Quebec, Quebec City, two 50 ft. rein.-con. span bridge over Achigan River, St. Sophie, to J. T. Levasseur, 3131 Massin St., Montreal, est. **$35,000.** Bids 6/30, CD 6/23—ENR 6/25; two 50 ft. span, rein.-con. bridge, Paspebiac, to A. Montmagny, 7 Main St., St. Francois de Montmagny., est. **$35,000.** Bids 6/23.

STREETS AND ROADS

BIDS ASKED

Bids Asked July 20

Connecticut—State Hy. Dpt., Hartford, bituminous macadam surfacing 757 ft. DA-NI-3, East Hartford, plans deposit $1; waterbound macadam surfacing 4,075 ft. town aid project, Meriden, plans deposit $1.70.

Bids Asked July 21

Kansas—State Hy. Dpt., Anthony, resurfacing 10 mi. K 5542, Comanche Co.; single asphalt surface treating 6.73 mi. K 5072, Sumner Co.; 2.005 mi. K 5073, Cowley Co.; 0.595 mi. K 5071, Part I, and 9.728 mi. K 5071, Part II, both Harper Co.; 6.096 mi. K 5074, Reno Co. R. C. Keeling, Topeka, engr.

★**Ohio**—State Hy. Dpt., Columbus, concrete resurfacing 0.342 mi. Sect. D of SH 727, Ashtabula Co., $3,110; 4.895 mi. Sects. G, H and L of SH 4, U. S. 23, Delaware Co., $54,620; 0.845 mi. Sect. Greenwich of SH 97, Huron Co., $21,430; 2.984 mi. Sects. Mentor and Willoughby of SH 2, U.S. 20, $53,380; tar concrete resurfacing Part 1, 5.42 mi. Sects. D, G, H and C of SH 56 and 438, $82,200; Part 2, 1.613 mi. Sect. M of SH 438, $28,400; widening, concrete surfacing 2.025 mi. Sects. J, O, L and Leroy of SH 97, U.S. 24, $35,100; 1.748 mi. Sects. A-1 of SH 406, Scioto Co., $27,180; grading, widening, macadam and bituminous surfacing, roadside imprv. 4.159 mi. Sects.A and C of SH 65, Montgomery Co., $191,400; grading, draining, concrete paving, roadside imprvt. 0.174 mi. Sect. Beverly of SH 393, Washington Co., $16,900; grading, exten. drainage structures, widening, tar concrete resurfacing 8.439 mi. Sects. H, I, J and P of SH 96, Wayne Co., $132,070.

Bids Asked July 22

Md., Baltimore — City, Bd. Awards, City Hall, sheet asphalt paving streets, Bur. Hys. Contr. S.A. 770.

Bids Asked July 23

Nebraska—State Dpt. Roads & Irrigation, W. G. Scott, state engr., Lincoln, gravel maintenance, Pawnee City-Tecumseh Rd., Patrols 11012 and 11058; Pawnee City-Burchard-Lewiston and Burchard S., Patrols 11025 and 11051; Tecumseh-Beatrice Rd., Patrol 11029; Lincoln-Bennett-Adams, Patrol 11045; Eagle-Palmyre, Patrol 11047; Falls City-Stella-Howe and Howe, W., Patrols 11052 and 11055; St. Edward-Monroe, Patrols 21015 and 21016; Newman Grove-Humphrey Rd., Patrol 21019; Elkhorn-Kennard Rd., Patrol 21031; Ceresco-Ashland and Ashland-Hahoo and Memphis E., Patrols 21034 and 21035; Gretna, Papillion and Bellevue Rd., Patrol 21038; Allen-Ponca and Ponca-Newcastle Rds., Patrols 31030 and 31048; Norfolk-Winside and Wayne Rds., Patrols 31038 and 31039; Madison-Albion Rds., Patrol 31059; soil cement base course paving Fairmont-McColl Junction Rd., SN-FA-143-A and 143-G, over $25,000; oiled road access road 1 mi. FA-DA-WR, grading, sand gravel surfacing, culverts, roadside imprvs., stabilized base course prime coat armor coat, bit. mat, surface course 0.03 mi. FA-Access Rd. No. DA-WR 7, U.S. Avia.

Bids Asked July 24

Arizona—St. Hy. Comm., widening concrete pavement 4.6 mi. Luke Field-Glendale Hy., AW-FHS 21-A (1). Over $50,000. Plans deposit $5.

Texas—D. C. Greer, engr. State Hy. Dpt., Austin, grading, structures, concrete paving 1.212 mi. Hy. 87, DANI-8-A(1), Orange Co., $80,000; grading, culverts, flexible base, double asphalt surface treating 7.174 mi. Hy. M.R.-D.A.W.R. 41-A(1), B(1), C(1) and D(1), Potter and Carson Counties, $160,000; grading, culvert, 2.893 mi. Hy. 183, SN-A-FAP-634 C(1), Tarrant Co., $40,000; 7.097 mi. Hy. 183, SN-FAP-634 F(1), Dallas Co., $160,000.

Bids Asked July 27

†Kansas—U. S. Eng., Albuquerque, N. M., grading, paving, drainage, Inv. W-911-43-1.

Bids Asked July 29

California — State Div. Hys., Sacramento, grading, surfacing 1.9 mi. Contra Costa Co. Over $25,000. C. H. Purcell, Sacramento, engr.

Bids Asked July 30

California—State Div. Hys., Los Angeles, grading, concrete paving 3.5 mi. Rosecrans St. and Mission Valley Rd. between Lytton and 6 Sts., over $25,000; 3.7 mi. Harbor Dr. between Civic Center and Rosecrans St., Dist. XI, over $25,000, both San Diego Co. C. H. Purcell, Sacramento, engr.

Bids Asked July 31

Minnesota—State Hy. Dpt., St. Paul, graveling 5.2 mi. S.P. 5302-10 (Trunk Hy. 16-9), 5303-11 (TH 16-9), 5305-14 (TH 60-85 and 53-6-12 (TH 60-85), plans deposit 55c.; bituminous surfacing 1.5 mi. S.P. 2652-13 (TH 55-188), and S.P. 2735-25 (TH 100-130), plans deposit 70c.; 1.7 mi. Project 69-505-04, FAS 9 D(1), St. Louis Co., plans deposit 55c.; furnishing, hauling, stockpiling mineral aggregate in Maintenance Dists. 4 and 6, railroad installation in Ramsey Co. J. T. Ellison, ch. engr.

†New York—Pub. Bldgs., Admin., 9 and D Sts. S.W., Wash., D. C., concrete road.

Bids Asked

California—State Div. Hys., Sacramento, rejected bids June 24, plant mix surfacing 10.9 mi. Placer and Nevada Counties; 5.7 mi. Yolo Co. C. H. Purcell, Sacramento, state hy. engr. CD 6/29—ENR 7/2.

†Florida—U. S. Eng., Courthouse & Post-office, Jacksonville, clearing, grading, paving, drainage streets, Jax 42-128.

Georgia—State Hy. Dpt., Atlanta, rejected bids July 3, imprv. 0.808 mi. road, bridges, Bryan and Effingham Counties. CD 6/23—ENR 6/25.

Ia., Independence—Bd. Supervs. Buchanan Co., rejected bids July 3, grading 5.64 mi. roads. Received no bids July 3 11.845 mi. roads. Over $25,000. CD 6/30.

Missouri—State Hy. Comn., Jefferson City, rejected bids June 26, imprv. roads Pulaski, McDonald and Maries Counties. CD 6/16—ENR 6/18.

†Texas—U. S. Eng., Fort Sam Houston, asphalt paving roads, concrete sidewalks, etc. Spec. 42-177. **$45,000.** Plans deposit $25.

†Texas—U. S. Eng., 25 St. and Ave. F, Galveston, asphalt street paving. $225,000. Plans deposit $50.

LOW BIDDERS

Arkansas—State Hy. Dpt., Little Rock, July 2, gravel surfacing 12.6 mi. Mississippi Co., from J. P. McNulty Constr. Co., 300 Mulberry St., Pine Bluff, **$31,264,** CD 6/23—ENR 6/25; imprv. 15.3 mi. Washington Co., from Pioneer Constr. Co., Malvern, **$37,278,** CD 6/24.

California—State Div. Hys., C. H. Purcell, engr., Sacramento, July 2, imprv. 4.3 mi. Lassen Co., from Poulos & McEwen, P. O. Box 1017, Sacramento, **$39,848.** CD 7/6.

California—State Div Hys., Sacramento, July 8, imprv. 23.8 mi. San Luis Obispo Co., from A. J. Raisch, 46 Kearny St., San Francisco, **$264,739;** 2.6 mi. San Mateo Co., from Harms Bros., Route 4, Box 2220, Sacramento, **$255,769.** CD 6/23—ENR 6/25.

California—State Hy. Dpt., Sacramento, concrete paving 0.5 mi. VII L.A. 158-B, and 1.3 mi. VII-La-68-HMB RDOB, both Los Angeles Co. from Griffith Co., 502 L. A. Ry. Bldg., Los Angeles **$42,590** and **$76,861** respectively. CD 6/23—ENR 6/25.

★**Connecticut**—State Hy. Dpt., Hartford, July 9, imprv. 16,443 ft. hy. Groton, from D. V. Frione & Co., Inc., 87 Foxon Rd., New Haven, **$397,225;** 9,410 ft. Stratford, from Pascone Bros., Inc., 73 Steuben St., Bridgeport, **$111,330.** Bids 7/9. CD 7/2.

D. C., Wash.—Dist. Comrs., July 10, imprvs. roadways, 6 St. N.E., from K St. to Florida Ave., from Wilmoth Paving Co., 1 and T Sts. S.W., **$41,626.**

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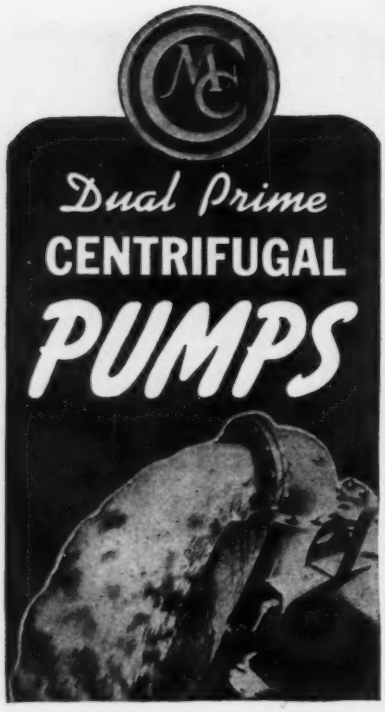

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STREETS, etc. (Low Bidders, Cont'd.)

D. C., Wash.—District Comrs., July 9, imprvs. Independence Ave. S.W., from 6 to 12 Sts., from Highway Eng. and Constr. Co., 7 and T Sts. N.E., **$106,652.**

★**Georgia**—State Hy. Dpt., W. E. Wilburn, chn., Atlanta, July 3, imprv. 8.781 mi. McIntosh Co. and 1.640 mi. Bibb Co., from W. L. Cobb, Inc., Decatur, **$200,270 and $237,616** respectively, est. $200,000 ea.***5.141 mi. Lamar Co., from John Whitley Constr. Co., LaGrange, **$129,871,** est. $132,000***3.836 mi. Bibb Co., from M. R. Woodall Co., Inc., 1594 Lakewood Ave. S.E., Atlanta, **$144,837,** est. $150,000***0.416 mi. Chatham Co., from John Monaghan, Inc., Pelham, **$31,497, est. $48,000. CD 6/23—ENR 6/25.**

Illinois—Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, July 10, imprv. 4.6 mi. Will Co., from Powers Thompson Constr. Co., Joliet, **$558,514***16,314 sq. yd. Peoria Co., from Standard Paving Co., 30 N. LaSalle St., Chicago, **$119,139***15,855 sq. yd. Bureau Co., from E. M. Melahn Constr. Co., Algonquin, **$134,354***1.45 mi. Cook Co., from Gallagher Asphalt Co., Thornton, **$41,706***6,910 sq. yd. Hancock Co., from Hurden Constr. Co., 614 Reisch Bldg., Springfield, **$212,549***4,440 sq. yd. Kankakee Co., from Superior Concrete Constr. Co., 1722 E. 56th St., Chicago, Ill., **$32,100***4,560 sq. yd. Montgomery Co., from J. C. Bremer, 629 Roundtree St., Hillsboro, **$34,968***12,720 sq. yd. Randolph Co., from Regenhardt Constr. Co., Cape Girardeau, Mo., **$94,175***12,540 sq. yd. Saline, Gallatin, White, Williamson and Johnson Counties from Mautz & Oren, Inc., Effingham, **$96,458***49,894 sq. yd. Will Co., from Walsh Oil Co., Inc., 72 W. Jefferson St., Joliet, **$31,567***4,779 sq. yd. Woodford Co., from Berenz & Son, 201 E. Grove Ave., Bloomington, **$42,076.** Received no bids 7/10, imprv. roads in Franklin, Williamson and Bureau Counties. CD 7/3.

Kentucky—Dpt. Hys., Frankfort, July 10, imprv. 9.271 mi. Boyle and Lincoln Counties, and 10.549 mi. Lincoln Co., from Gay-Coleman Const. Co., Lexington, **$57,115** and **$67,057** respectively***0.649 mi. Hardin Co., from A. Snider, Danville **$50,723***imprvs. hys. Group 1, Jefferson and Oldham Counties, from H. K. Williams, 1326 S. 7 St., Louisville, **$33,338***0.597 mi. Warren Co., from Lyons & Breeden, Rogersville, Tenn., **$88,544.** CD 6/23—ENR 6/25.

Louisiana—Dpt. Hys., Baton Rouge, July 2, imprv. 4.471 mi. Orleans and Plaquemines Parishes, from W. L. Stevens, 202 Whitney Bldg., New Orleans, **$195,938.** Received no bids July 2, imprv. 12.521 mi. Rapides Parish. CD 5/28 and 6/23—ENR 6/4 and 6/25.

Minnesota—State Hy. Dpt., St. Paul, Minn., graveling 3.1 mi. S.P. 3307-06, from Kotschevar Constr. Co., Richmond, Minn., **$44,687***7.8 mi. S.P. 3009-09 (TH 65-189) and S.P. 33313-06 (TH 65-189) from Zontelli-Herbison, Inc., Ironton, **$78,009***4.7 mi. S.P. 4006-18 (TH 60-60), from J. H. Ganley Co., 2336 Hampton Ave., St. Paul, **$42,962***12.8 mi. road S.P. 4903-06 (TH 10-37), from Hector Constr. Co., Hector, **$91,163***6.3 mi. road S.P. 4501-09 (TH 1-175) from P. C. Roth & Son, Brainerd, and R. C. Jones, Deerwood, **$34,795.** CD 6/16 —ENR 6/18.

Ohio—State Hy. Dpt., Columbus, July 7, imprv. 3.274 mi. Ross Co., from Southern Ohio Quarries Co., 150 E. Broad St., Columbus, **$38,060,** est. $38,400; 4.054 mi. Allen Co., from S. E. Johnson Co., 218 Terminal Bldg., Toledo, **$30,236,** est. $30,520. Received no bids July 7, imprv. 0.765 mi. Lucas Co., 0.271 mi. Lake Co., 1.816 mi. Henry Co., 3.787 mi. Brown Co. CD 6/25—ENR 7/2.

†**South Carolina**—U. S. Eng., Post Office Bldg., Savannah, Ga., June 30, grading, utilities, Sects. A and B, from E. D. Sloan, Greenville.

Texas—State Hy. Dpt., Austin, July 6, reshaping base and asphalt concrete paving 9.229 mi. Hy. MR, Control 15-5-11, DAWR 3-C(1), from Colglazier & Hoff, 326 Sequin Rd., San Antonio, **$66,785.**

★**Virginia**—Dpt. Hys., Richmond, July 7, imprv. 2.3 mi. Fairfax Co., from Corson & Gruman Co., 33 and K Sts. N.W., Wash., D. C., **$264,782;** 1.7 mi. road and 161 ft. overpass, Norfolk Co., from W. H. Scott, Franklin, **$379,521.** CD 6/25 and 6/26—ENR 7/2.

CONTRACTS AWARDED

★†**Arizona**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., road, to L. M. White Contg. Co., St. Mary's Rd., Tucson, less than **$1,000,000.**

★†**Arkansas**—U. S. Eng., U. S. Postoffice & Court House, Vicksburg, Miss., road, to D. B. Hill, 115 N. Spring St., Little Rock. Est. less than **$1,000,000.**

★**Arkansas** — State Hy. Dpt., Little Rock, imprv. 14.6 mi. Lake Village to McGehee Rd., State Hy. 65, to Gregory-Hogan, 155 N. Spring St., Little Rock, **$595,148;** 8.8 mi. Monroe Co., to J. P. McNulty Constr. Co., 300 Mulberry St., Pine Bluff, **$27,086.** Bids 7/2, awarded 7/2. CD 6/23—ENR 6/25.

★†**Kansas**—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., crushed stone roads, tank and motor parks, to M. W. Watson, Natl. Bank of Topeka Bldg., Topeka, **$745,181;** concrete pavement, driveways, to L. V. Hites Co., City Bank Bldg., Kansas City, Mo., **$465,550.**

†**Louisiana**—U. S. Eng., foot of Crytania St., New Orleans, access roads and railroad, Inv. 615, to Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge. Bids 7/1, awarded 7/8. CD 7/1.

La., New Iberia—36,000 sq. ft. concrete sidewalks, to Iberia Sand & Gravel Co., New Iberia. Awarded 7/6.

Maryland—State Roads Comm., Baltimore, grading, drainage, graveling 2.661 mi. Charles Co., to T. Edgie Russell Co., Frederick **$29,233;** 2.31 mi. Kent Co., to E. Earle Downing, Inc., Del Trust Bldg., Wilmington, Del., **$33,968.** CD 6/30—ENR 7/2.

★**Michigan**—State Hy. Dpt., Lansing, imprv. 2.271 mi. Wayne Co., to Louis Caravaglia, 4514 Burns Ave., Detroit. **$549,933.** CD 7/1 —ENR 7/9, under LB.

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, roadway, open drainage ditch, to Charles J. Rogers Co., 14836 Grand River, Detroit, less than **$1,000,000.**

Minn., Duluth—St. Louis Co., W. H. Borgen, aud., bituminous surfacing 22 mi., seal coat surfacing 4.5 mi. Project 660-20, 662-525, 667-19, 671-7, 458-603, 451-88, 453-77 and 544-35, to Ashworth-Hawkinson Co., St. Louis Park, **$36,928** and **$24,380** respectively. Bids 6/23.

Minn., St. Cloud—Stearns Co., F. Rambler, aud., road imprvs., **WPA $424,597.** J. S. Schmit, St. Cloud, co. hy. engr.

★†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, road and channel construction and sewerage sys., to Abel Constr. Co., 900 N. 16 St., and Dobson and Robinson Constr. Co., 823 1st Natl. Bank Bldg., both Lincoln, **$2,564,500** and **$136,431** respectively***culvert pipe for roads and channel excav., to G. H. Lowe and R. Green, 207 2 Ave. S.W., Cedar Rapids, Ia. **$504,703***bridge, to Liggett and Knapp Const. Co., Lincoln, **$104,131.** Grand total $3,309,765. CD 5/1—ENR 5/7.

Neb., Bellevue — Elizabeth P. Smith, city clk., sidewalks, storm sewers. **WPA. $375,-079.** H. H. Henningson Eng. Co., 626 Standard Oil Bldg., Omaha, engrs.

Neb., Omaha—Douglas Co., black top paving County Hy. 96, to Western Bridge & Constr. Co., 72 and Pacific Sts. **$79,998.**

★**New Jersey**—S. Miller, Jr., comr. State Hy. Dpt., Trenton, imprv. Sects. 3 and 4A road, Spicertown, Morris Co., to Franklin Contg. Co., 20 Washington Pl., Newark. **$824,871.** Bids 6/15. CD 6/18—ENR 6/25, under LB.

O., Elyria—Lorain Co., resurfacing roads, to H. J. Hart, 912 Middle Ave. **$39,309.** Bids 5/25. CD 5/12—ENR 5/14.

Pa., Pittsburgh—Comrs. Allegheny Co., completion rough grading, draining Moss Side Blvd., Sects. 2 and 3, North Versailles Twp., to John Carson & Sons, 1248 Pennsylvania Ave. N.S., Pittsburgh. **$87,457.** Bids 6/23. CD 6/9—ENR 6/11.

Pa., Pittsburgh—Comrs. Allegheny Co., R. G. Woodside, controller, 104 Court House, imprv. Spring Run Rd., Moon and Findlay Twps., to E. Kean, 4932 Rosetta St., **$46,176.** Bids 6/16. CD 5/26—ENR 5/28.

†**Texas**—U. S. Eng., Fort Sam Houston, asphalt paving, constructing roads, to M. E. Ruby, Wallace & Bowden, Littlefield Bldg., Austin, $72,000. Additional to CD 7/6—ENR 7/9 under CA.

Washington—State Hy. Dpt., Olympia, imprv. 1 mi. Thurston Co., to Washington Asphalt Co., 339 W. 39 St., Seattle, **$43,509***5.6 mi. Thurston Co., to Goetz & Brennan, Seaboard Bldg., Seattle, **$200,068***roads Whitman and Spokane Counties, to D. A. Sullivan, Parkwater, **$42,895***14.8 mi. Grays Harbor Co., to Grays Harbor Constr. Co., Aberdeen, **$98,105***37.4 mi. Adams and Whitman Counties, to Standard Asphalt Paving Co., Chronicle Bldg., Spokane, **$48,751.** Grand total **$453,328.** Bids 7/7. CD 6/23.

Wis., Wausau—Marathon Co., imprv. roads, own forces. **$40,000.** J. A. Clark, Wausau, co. engr.

Alberta—Province of Alberta, Edmonton, hy., Ryley, to T. Kirwan, 8 St., Edmonton, est. **$70,000;** graveling 40 mi. hy., Grimshaw, and 28 mi. hy., Beaveriodge, day labor, **$44,000** and **$30,000** respectively. Grand total $144,000.

New Brunswick—Province of New Brunswick, Fredericton, graveling roads, Rogerville, to Forbes & Sloat, Devon. Est. **$30,000.**

Quebec—Province of Quebec, Quebec City, grading, paving 0.64 mi. St. Louis Rd., Quebec City, to Union des Carrieres, etc., Pavages, Ltd., 48 Second Ave., Quebec City, **$70,000;** 6.3 mi. Levis, to D. Verochio, 6811 Monkland St., Montreal, **$201,000.** Bids 6/16. CD 6/11.

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PROPOSED WORK

†**Idaho, Mountain Home**—Bureau Reclamation, Boise, received no bids June 19, clearing

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1,000 acres Anderson Ranch reservoir site on Boise project, Spec. 1643-D. CD 6/3—ENR 6/11.

★**†South Dakota**—Bureau Reclamation, Custom House, Denver, Colo., Deerfield Dam of Rapid Valley Project. $500,000. CD 6/30—ENR 7/2.

★**†Texas**—U. S. Eng., Citizens Bank Bldg., Denison. addnl. work on Red River Dam project, exten. concrete dam proper, sluices, embankments, etc. $10,952,000.

★**†Texas** — Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash., D. C., irrigation project, area of Nueces River and tributaries. $5,000,000.

†Tex., Orange—City, A. Sokolski, mayor, rejected bids June 29, drainage and dykes, Tex 41-318. $75,228. **FWA.** Will readvertise. CD 6/15—ENR 6/18.

Ont., Windsor—Empire Hanna Coal Co., Ltd., 1102 Canada Bldg., pile retaining wall in Detroit River. $20,000.

Que., Bryson—Provincial Govt., Quebec City, dam on Ottawa River. $50,000. Dpt. P. Wks., Quebec City, engrs.

BIDS ASKED

Bids Asked July 21

Pa., Nanticoke—F. Marchinkowski, city clk., dredging 1400 ft. Forge Creek, 5 ft. deep, 14 ft. wide. $15,000.

Bids Asked July 23

Ont., Port Dalhausie—Hydro-Electric Power Co., 620 University Ave., Toronto, earth and rock excav., to form approach and discharge channels, concrete control works, highway bridge, and roadway, etc., between Martindale Pond and 3rd Welland Canal, for De Pew Falls Extension. $75,000.

Bids Asked July 31

†Washington—Bureau Reclamation, Coulee Dam, earthwork, structures, surfacing, relocation Lincoln County Rd., Creston to Fort Spokane, Columbia River Reservoir, Columbia Basin Project, near Creston, Spec. 1042; adv. ENR 7/16.

CONTRACTS AWARDED

★**†Arkansas**—U. S. Eng., P. O. Box 97, Memphis, Tenn., earthwork, Inv. 1092-42-198F, to Alex Raney, Paris, Tenn. Est. less than **$1,000,000.**

★**†Arkansas** and **Mississippi** — U. S. Eng., O. Box 97, Memphis, Tenn., June 18, earthwork Mississippi Co., Ark., to Wm. Crumpecker and Son, Morehouse, Mo., less than **$1,000,000**; earthwork, Tunica Co., Miss., to Boone & Webster Constr. Co., Inc., McCall Bldg., Memphis, Tenn., less than **$1,000,000**, both Inv. 1092 42-198F. CD 6/3—ENR 6/11.

★**†California**—U. S. Eng., Wright Bldg., Sacramento, levee work at south levee Tisdale By-Pass, Inv. 85, to H. Earl Parker, 112 G St., Marysville, and to N. M. Ball Sons, P. O. Box 404, Berkeley, **$814,780.** Bids 6/20. CD 6/25—ENR 7/2.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, levees, bridges, etc. for fire protection project, No. 425, to Oberg Bros., O. Oberg & H. A. Moore, 3914 W. Slanson Ave., **Los Angeles. Est. over $25,000.** Awarded 7/9.

†Kansas—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., 600,000 cu. yd. excav., to Ottinger Bros., Hinton, Okla.

Md., Baltimore—Bd. Awards, City Hall, July 1, maintenance dredging Baltimore Harbor, from Arundel Corp., Pier 2, Pratt St., **$46,690.** CD 6/24.

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, excavating, dirt and grading work, to Uvalde Constr. Co., Santa Fe Bldg., Dallas, **$68,000.**

†Wyo., Cody—Bureau Reclamation, Cody, June 19, Heart Mountain Canal in Heart Mountain Div. of Shoshone Project, Spec. 1642-D, from Barnard Curtiss Co., 808 Phoenix Bldg., Minneapolis, Minn., **$15,961.** CD 6/2—ENR 6/4.

UNCLASSIFIED

PROPOSED WORK

Ark., El Dorado—DOCKS, etc.—Gulf Refining Co., El Dorado, docks, tanks, facilities; 158 mi. pipeline from Eldorado to Helena.

Ark., Texarkana—RAILROAD YARD IMPROVEMENTS — Missouri Pacific R.R., St. Louis, Mo., yard imprvs., tracks, freight handling facilities. $52,200.

★**†Connecticut** — SITE IMPROVEMENTS — Pub. Housing Auth., NHA, 24 School St., Boston, Mass., rejected bids July 2, site imprvs., community house, water, sewer, electric utilities. CD 7/7—ENR 7/9, under LB.

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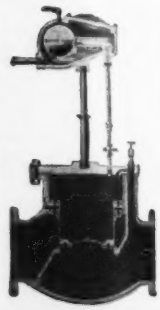
This valve is particularly adaptable for water level control in heaters, reservoirs, basins, etc., under high inlet pressure where a very close water level must be maintained. The valve is suitable for open or closed tank service, and may be arranged with "stop check" piston design to act additionally as a check valve to prevent any reverse flow if the upstream head lowers below the tank head. It may also be arranged for various special service operations.

Needle valve control permits regulating closing speed of the valve to suit conditions, and inherent air and water cushioning assures smooth operation at all times without any shock or bang.



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UNCLASSIFIED (Proposed Work, Cont'd.)

Ill., Chicago—MEMORIAL SHAFT—33rd Division War Veterans Assn., 79 W. Washington St., marble or granite memorial shaft, 16 St. and Outer Dr. $150,000.

Ia., Cherokee—AIRPORT—Enlarging, imprv. airport. $75,000. $60,000 voted.

★**†Kansas**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., rejected bids June 13, imprvs. Over $3,000,000. CD 6/30 and 7/2—ENR 7/2 and 7/9, under LB.

Kan., Manhattan — AIRPORT — D. Arnold, mayor, expanding airport. $250,000. Will apply for FWA funds.

★**Kan., Emporia**—AIRPORT — Voted $250,000 bonds, airport. Approx. $500,000. Plan FWA participation. CD 6/9—ENR 6/11.

†Maine — UTILITIES, etc. — Farm Security Admin., A. Kopp, bus. mgr., 17 Brief Ave., Upper Darby, Pa., rejected bids June 27, revising plans utilities, water, sewer and electric utilities, roads, sidewalks, etc. CD 7/2 —ENR 7/9.

Maryland — IMPROVEMENTS — Bethlehem Ship Building Co., 1101 Key Hy., Baltimore, soon lets contract imprvs., bldgs. $250,000.

Massachusetts — IMPROVEMENTS — Bethlehem-Hingham Shipyard Inc., E. Howard St., Quincy, soon lets contract imprvs., bldg. $40,000 or more.

Minnesota — ELECTRIC DISTRIBUTION LINES — North Star Electric Co-operative, Inc., C. Paterson, mgr., Baudette, 331 mi. rural electric distr. lines, Koochicking Co. $346,500 REA allot. General Eng. Corp., 2944 Cedar Ave., Minneapolis, engrs.

Minnesota — RURAL ELECTRIC LINES — Tri-County Electric Co-operative, Inc., E. J. Kjos, coordinator, Rushford, 498 mi. rural distr. sys., Fillmore, Mower, Winona and Houston Counties, etc., Banister Eng. Co., 1586 University Ave., St. Paul, engrs.

O., Ashtabula—GOLF COURSE—Lake Shore Golf Club, R. Morrison, mgr., 18-hole golf course, on 93 acre site. $25,000.

†Oklahoma—IMPROVEMENTS—U. S. Eng., Citizens Bank Bldg., Denison, Tex., imprvs., bldgs., etc.

★**†Oklahoma** — IMPROVEMENTS — U. S. Eng., 416 Wright Bldg., Tulsa, imprvs. $2,000,000.

Pennsylvania — TRACK RAISING, etc. — Baltimore & Ohio R.R., A. C. Clarke, ch. engr., Baltimore, Md., raising tracks, new ties, ballasting, replacing rails, etc., between Clarion Jct. and Hutchins, Pa. Over $25,000.

R. I., Hillsgrove—CONTROL TOWER—State, Airport Administrator, State Airport Office, bids soon, rein.-con., steel airport tower. Walter F. Fontaine, Inc., 285 Main St., Woonsocket, archts.

Tenn., Clarksville—HANGARS, etc.—Montgomery Co., rebuilding hangars, concrete airport apron.

Tenn., Columbia—AIRPORT—Airport.

Tenn., Martin—AIRFIELD—Grading section airfield, concrete runway.

†Texas—FACILITIES—U. S. Eng., Federal Bldg., Galveston, facilities.

Tex., Karnes City — RURAL ELECTRIC LINES—Karnes Electric Co-operative, Karnes City, rural electric lines. $385,000.

†Washington — IMPROVEMENTS — U. S. Eng., Textile Tower, Seattle, imprvs.

Wisconsin — IMPROVEMENTS — Ashland Shipbuilding Co., W. S. Jenks, secy., White Bear, Minn. imprvs.

Alta., Bowden—AIR OBSERVER SCHOOL—Dominion Govt., Ottawa, Ont., air observer school. $200,000. Dpt. Air Defense, archt. and Dpt. Munitions & Supply, engr., both Ottawa, Ont.

Alta., McMurray—OIL SAND DEVELOPMENT—Alberta Nitrogen Products Ltd., Calgary, developing oil sands. Initial cost $50,000.

★**Canada** — AIRPORTS — Secy. Dpt. Munitions & Supply, Ottawa, Ont. Bids soon airport expansion for A. O. schools, at Walton $500,000, London, $1,000,000, and Hamilton $500,000, all foregoing in Ontario; at Edmonton, Alta. $500,000; Winnipeg $1,000,000, Portage La Prairie $500,000 and Rivers $1,200,000, foregoing in Manitoba; Quebec City, Que., $500,000; Regina $1,000,000, Prince Albert $0,000,000, both in Saskatchewan, for Dpt. National Defence for Air, Ottawa, Ont.

Man., Portage La Prairie—AIR OBSERVER SCHOOL—Dominion Govt., Ottawa, Ont., air observer school enlargement. $200,000. Dpt. Air Defense, archt. and Dpt. Munitions & Supply, engr., both Ottawa, Ont.

★**New Brunswick** and **Prince Edward Island** — TUNNEL — Dominion Govt., Ottawa, Ont., tunnel from New Brunswick to Prince Edward Island. Dpt. P. Wks., Ottawa, Ont., engrs.

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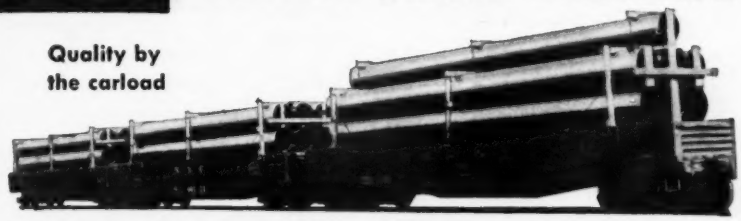

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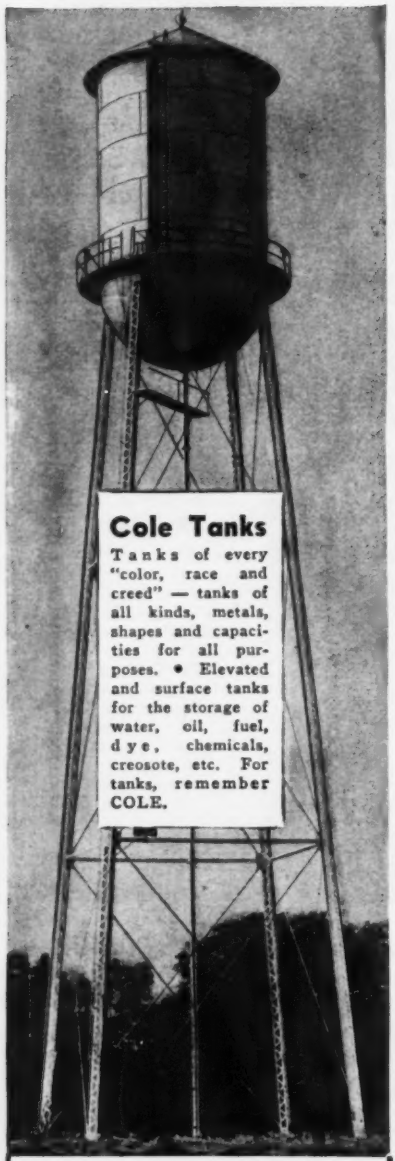

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N. S., Amherst—AIRPORT—Dpt. Munitions & Supply, airport exten., to B. H. Williamson, 1 Edward Ave., Fairville, St. John, N. B. $200,000. CD 5/27—ENR 6/4.

Ont., Chatham—PIER, GAS WELL—West Petroleum Ltd., Chatham, pier construction, drilling and operation natural gas well, waters of Lake Erie, front of Talbot Rd. $70,000.

Ont., Collingwood — IMPROVEMENTS — Richards & Abia, archts., 55 Metcalfe St., Ottawa, soon let contract imprvs., bldgs., for Collingwood Shipyards, Ltd., Huron St. $58,000.

Ont., Cornwall — RAILWAY SIDINGS — Canadian National R.R., Union Station, Toronto, Ont., B. Wheelwright, ch. engr., 3 mi. railway sidings.

Ont., Hamilton — RAILROAD SPUR — Toronto, Hamilton & Buffalo R.R., F. E. Williamson, pres., 230 Park Ave., New York, N. Y., railroad spur. $40,000.

Ont., Malton (Toronto)—FLYING SCHOOL, etc.—Secretary Dpt. Munitions & Supply, Ottawa, bids soon expanding E.F.T. School and Air Observers School for Dpt. National Defense for Air, Ottawa. About $200,000.

Sask., Davidson — AIR OBSERVERS SCHOOL—Dominion Govt., Ottawa, Ont., air observers school. $150,000. Dpt. Air Defense, Ottawa, archt., and Dpt. Munitions & Supply, engr., both Ottawa, Ont.

Sask., Regina — FLYING SCHOOL — Dominion Govt., Ottawa, Ont., elementary flying training school. $200,000. Dpt. Air Defense, archts., and Dpt. Munitions & Supply, engr., both Ottawa, Ont.

Que., Landenet—POWER DEVELOPMENT—Province of Quebec, Quebec City, power development increasing horsepower from 15,000 to 30,000 hp. Quebec Running Streams Comn., 7 Notre Dame St. E., Montreal, engrs.

Que., Lauzon—FLYING SCHOOL—Dominion Govt., Ottawa, Ont., plans by Dpt. Air Defense, Ottawa, Ont., exten. Flying Training School. $150,000. Dpt. Munitions & Supply, Ottawa, Ont., engrs.

Que., Quebec City—ARENA—Quebec Arena Co. Ltd., Victoria Park, Amede Demers and Nap. Cote, 80 Chemin Gouin, reconstructing arena. $150,000.

Que., St. Honore—AIRPORT—Dpt. Transport, Ottawa, Ont., bids soon, airport. $175,000.

BIDS ASKED

Bids Asked About July 20

✦**Texas** — STORAGE FACILITIES — U. S. Eng., Fort Sam Houston, storage facilities, incl. pumphouse, tanks, etc. Plans deposit $25.

Bids Asked July 22

✦**Missouri**—IMPROVEMENTS — Civil Aeronautics Admin., City Hall Bldg., Kansas City, Mo., imprvs. Plans deposit $10; adv. ENR 7/16.

Bids Asked July 27

✦**Kansas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., grading, paving, drainage, Inv. W911-43-1.

Bids Asked July 30

✦**Vermont**—IMPROVEMENTS — U. S. Eng., Custom House, Boston, Mass., imprvs.

Bids Asked

✦**California**—IMPROVEMENTS—U. S. Eng., U. S. Eng., 74 New Montgomery St., Los Angeles, imprvs., bldgs., Inv. 509-42-557.

✦**Florida**—ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., Courthouse & Postoffice, Jacksonville, electrical distr. sys., Jax 42-130.

✦**Maryland**—GAS FUELING SYSTEM—U. S. Eng., Standard Oil Bldg., Baltimore, gasoline fueling sys. Plans deposit $10. CD 4/7—ENR 7/9.

✦**New Hampshire**—IMPROVEMENTS—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., imprvs., paving. $445,000. Plans deposit $25.

✦**New Mexico** — RAILROAD SPUR — U. S. Eng., Albuquerque, railroad spur addn.

✦**New Mexico** — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., temporary bldgs., EP-306-U. $275,000.

✦**New Mexico** — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., sewage disposal plant.

✦**New Mexico**—ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., Albuquerque, electric distr. sys.

★✦**Texas** — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, imprvs., paving, etc. $900,000. Plans deposit $50.

✦**Texas** — ELECTRICAL DISTRIBUTING SYSTEM—U. S. Eng., Fort Sam Houston, outdoor overhead electrical distr. sys. for streets, roads and bldg., Spec. 42-182. $40,000. Plans deposit $25.

✦**Texas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., bldg.

✦**Texas** — STORAGE FACILITIES — U. S. Eng., Fort Sam Houston, storage and dispensing facilities, Spec. 42-179. $75,000. Plans deposit $25.

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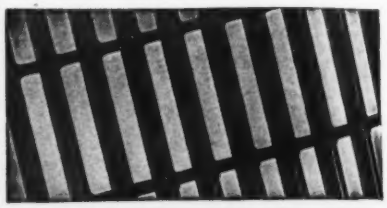

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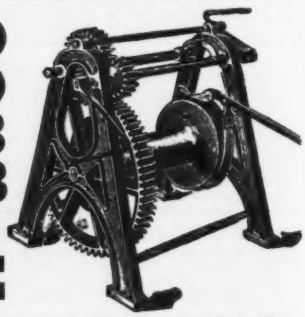

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Que., Ancienne Lorette—HANGARS—Secy Dpt. Munitions & Supply, Ottawa, 2 double and 2 single land plane hangars, for Dpt. Natl. Defense for Air, Ottawa, Ont. $450,000.

LOW BIDDERS

★**†Arkansas**—IMPROVEMENTS—U. S. Eng., Gay Bldg., Little Rock, imprvs., Contr. 1, from Stephens Bros., Miller-Hutchinson, Inc., 730 Gravier St., New Orleans; Contr 2, from E. Ptschnick, Capa Girardeau, Mo. Est. under $1,000,000.

Ill., Chicago—STATION PAINTING—At office P. Harrington, comr. Subways and Superhighways, 20 N. Wacker Dr., July 9, painting concrete, masonry, metal and other surfaces, etc., State St. and Dearborn St. subways, Contr. F-6, from P. Gottardo, 5666 W. West End St., $36,381. CD 6/30—ENR 7/2.

★**†Maine** — IMPROVEMENTS — U. S. Eng., Park Square Bldg., Boston, Mass., July 6, imprvs., from Herbert Sargent, Bennock St., Stillwater, $742,183. Est. $785,650. CD 7/3—ENR 2/12.

N. Y., Brooklyn—TOPSOILING—New York City Housing Auth., 122 E. 42 St., New York, July 9, topsoil, planting, Fort Green Housing, NYS-1, from Roman Landscaping Contg. Co., 551 5 Ave., New York, $123,975. CD 6/22—ENR 6/25.

†North Dakota—IMPROVEMENTS—U. S. Eng., Postoffice and Customhouse, St. Paul, Minn., June 24, imprvs., clearing, grubbing, grading, drainage, fencing, lighting, etc., from Archie Campbell, Warwick.

Ore., North Bend—AIRPORT—State Procurement Office, Weatherly Bldg., Portland, June 30, tie down anchors, manholes, catch basins, trenches, pipe and ducts, backfill work on apron, taxiway, etc., North Bend Airport, for City of North Bend, from O. C. Yocum, General Del., Willamina, $36,232.

★**†Tennessee** — IMPROVEMENTS — U. S. Eng., 306 Courthouse, Nashville, imprvs., bldgs., from A. R. Abrams Co., 41 Exchange Pl. S.E., Atlanta, Ga. Est. less than $3,000,000. CD 7/3—ENR 7/9.

CONTRACTS AWARDED

★**†Alabama**—ELECTRIC SUBSTATION—U. S. Eng., 306 Courthouse, Nashville, Tenn., electric sub-station, to F. W. Owens Co., 119 N. 5 St., Louisville, Ky. Est less than $1,000,000.

†Arizona—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., water distr. lines, facilities, to Murphey-Keith Bldg. Co., Box 2267, Tucson, $66,200.

★**†Arizona**—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., bldgs. and sanitary sewers, facilities, to Murphey-Keith Bldg. Co., Box 2267, Tucson. $1,300,000 and $175,000 respectively. CD 6/16.

★**†Arizona**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., imprvs., to Arizona Constructors, Homebuilders Bldg., Phoenix. Over $1,000,000. CD 6/16.

★**†Arizona**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., imprvs., utilities, to Vinson & Pringle, S. 19 Ave., Phoenix, over $500,000. Bids about 6/22. CD 6/16.

★**†Arkansas** — IMPROVEMENTS — U. S. Eng., P. O. Box 97, Memphis, Tenn., imprvs., Inv. 1092-42-226F, to Ziegler Constr. Co., American Natl. Bank Bldg., Nashville, Tenn. Est. less than $1,000,000.

★**†California**—FIRE ALARM SYSTEM — U. S. Eng., 74 New Montgomery St., San Francisco, manual fire alarm sys., to American District Telegraph Co., 150 Post St., San Francisco, under $1,000,000. Awarded 7/6.

†California—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, imprvs., to J. A. Haines, 1242 N. Jackson St., Los Angeles; imprvs., No. 652, to Calowell Constr. Co., 1835 E. Wordlow Rd., Long Beach. Est. over $25,000 ea. Awarded 7/3.

★**†California** — IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs., NOY 5377, to Pacific Bridge Co., 333 Kearny St., San Francisco. $14,500,000.

★**†California** — IMPROVEMENTS — U. S. Eng., Wright Bldg., Sacramento, imprvs., Spec. 91, to Frederickson & Watson Constr. Co., 875 81 Ave., Oakland. $897,258. Bids 6/29. CD 7/2—ENR 7/9.

†California — RAILWAY TRACK REMOVAL—U. S. Eng., Wright Bldg., Sacramento, removal 30 mi. Southern Pacific main line tracks, sidings, from Shasta Dam to Delta, to A. D. Schader, 144 Spear St., San Francisco.

†California—IMPROVEMENTS—U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., bldgs., to Paul C. Gibson, 372 Velarde St., Mountain View, under $1,000,000. CD 6/22—ENR 6/25.

†California—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, imprvs.,

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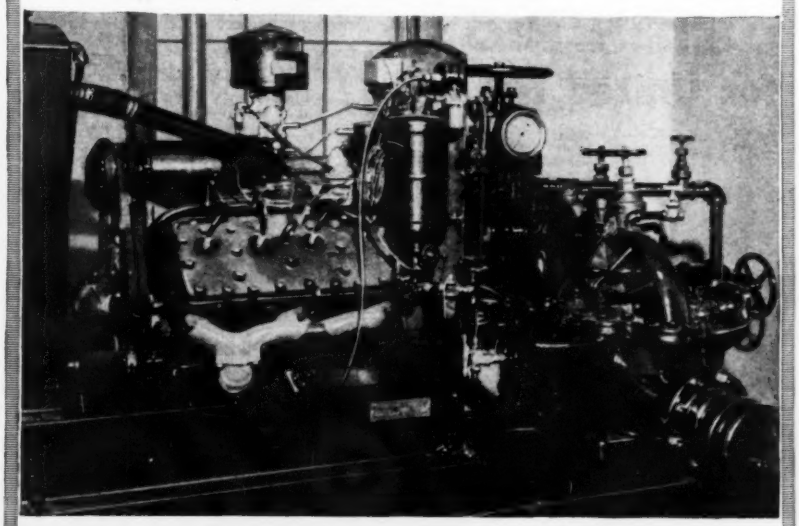

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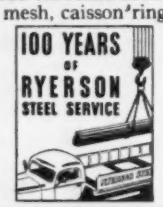

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utilities, grading, surfacing roads, Inv. 595, to C. V. Heuser, 816 Allen Ave., Glendale. Est. over **$25,000.** Bids 7/6, awarded 7/7.

★**†Florida**—IMPROVEMENTS—U. S. Eng., Courthouse and Postoffice, Jacksonville, Imprvs., to Polk Const. Co., Lakeland***to J. B. Gibson Const. Co., Donalsonville, Ga.*** to Oscar J. Steinert, 5027 14 Ave., St. Petersburg***railroad spur, to James Sotille, Homestead***fences, to Ryan Const. Co., Stovall Office Bldg., Tampa***electric distr. sys., to J. R. Hime Electric Co., 376 S. County Rd., Palm Beach, each contract for less than **$1,000,000.**

†Florida — IMPROVEMENTS — U. S. Eng., Courthouse & Postoffice, Jacksonville, imprvs., bldgs., to Watt & Sinclair, Inc., 207 Royal Palm Way, Palm Beach, Fla. Reynolds, Brewton, Smith & Hills, Rogers Bldg., Jacksonville, archts.

†Georgia—WIRING SYSTEM—U. S. Eng., Bellcraft, underground ducts, manholes and wire and conduit system in concrete slab for Branch Circuit wiring, to Miller Electric Co., 556 Riverside Ave., Jacksonville, Fla. Robert and Co., Bona Allen Bldg., Atlanta, engrs.

†Kansas—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., grading, paving, to List and Clark and San-Ore Constr. Co., McPherson.

Maryland — IMPROVEMENTS — Industrial Company, imprvs., bldg., to Cummins Constr. Co., 803 Cathedral St., Baltimore. **$150,000.**

†Massachusetts — IMPROVEMENTS — Industrial Company, imprvs., bldg., to Daniel Marr & Son Co., Inc., 384 Dorchester Ave., Boston.

★**†Maryland**—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., facilities, NOY 5594, to McLean Constr. Co., Fidelity Bldg., Baltimore, **$2,985,000.** CD 6/19.

★**†Maryland**—RAILROAD—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., rehabilitation railroads, NOY 5592, to James McGraw Co., Commercial Trust Bldg., Phila., Pa. **$1,500,000.**

★**†Ohio**—GAS MAIN—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., high pressure gas main, to West Ohio Gas Co., Lima, less than **$1,000,000.**

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, imprvs., bldgs., facilities, Inv. 957-42-252, to Leo Sander, Trade Natl. Bank Bldg., Oklahoma City. **$260,000.** CD 6/8—ENR 6/11.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, to Leo Sanders, Trade Natl. Bank Bldg., Oklahoma City, addnl. imprvs., bldgs., **$245,000;** sanitary sewer collecting lines, facilities, **$45,000;** water lines, **$24,500,** Inv. 957-42-252. Grand total $314,500. Awarded 6/28.

★**†Oklahoma** — IMPROVEMENTS — U. S. Eng., Denison, Tex., imprvs., grading, paving, to Dahlgren-Ryan, Brooks & Beckman, 2100 E. Park St., Oklahoma City. Total est. over **$1,000,000.**

†Oklahoma—RAILWAY SPUR TRACKS—U. S. Eng., Citizens Bank Bldg., Denison, Tex., railway spur tracks, to Missouri-Kansas & Texas Railroad, Katy Bldg., Dallas, Tex. **$68,400.** Awarded 7/2.

★**†Oklahoma**—IMPROVEMENTS—U. S. Eng., Citizens Natl. Bank Bldg., Denison, imprvs., to Hair Christie & Mason, Wichita Falls, Tex. over **$3,000,000.**

South Dakota—POWER TRANSMISSION LINES—Northern States Power Co., 315 S. Phillips St., Sioux Falls, relocating transmission power lines, own forces. **$25,000.** CD 7/1—ENR 7/9.

★**†Tennessee**—IMPROVEMENTS—U. S. Eng., 306 U. S. Courthouse, Nashville, imprvs., bldgs. to Boone Contg. Co., 3rd Natl. Bank Bldg., Nashville. Est. under **$3,000,000.**

Tennessee and **Indiana**—REPEATER STATIONS—American Telephone & Telegraph Co., Hurt Bldg., Atlanta, Ga., 8 repeater stations between Nashville, Tenn., and Evansville, Ind., to Jones & Son, Franklin, Tenn. Bids 6/25.

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, outside electrical distr. sys., Spec. 42-134, to B. B. Smith and Baldwin & Sheet Co., 1805 Donaldson Ave., San Antonio, **$32,600.** Bids 6/26, awarded 7/3. CD 6/19.

†Texas—ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston electrical distr. sys., street lighting sys., area lighting sys., etc., Spec. 42-125, to Wright Bros., Main Ave., San Antonio, **$28,225.** Est. $70,000. Bids about 6/26.

†Texas — IMPROVEMENTS — U. S. Eng., Citizens Bank Bldg., Denison, imprvs., to Texas Bitulithic Co., 111 Commerce St., Dallas, **$256,000.** Awarded 7/1.

†Texas — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, imprvs., to Ballentyne Eng. Co., Mission. **$92,600.** CD 6/25—ENR 7/2.

★**†Texas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N.M., imprvs., to Shelton Constr. Co., Houston, over **$3,000,000.**

†Texas—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., imprvs., grading, street, roads and asphalt paving, to Spencer Constr. Co., Lee Harris and Standard Paving Co., 2119 E. 11 St., Tulsa, Okla., approx. **$238,000.**

†Texas—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., imprvs., grading, to Pool Bros. Constr. Co., Spencer, Okla., **$140,000;** paving, to Austin Bridge Co., Clarence St., Dallas, **$284,000.**

†Texas—IMPROVEMENTS—U. S. Eng., Waco, general imprvs., ditching, drainage, etc., **WPA. $106,285.**

†Wyo., Sheridan—AIRPORT LIGHTING—Civil Aeronautics Auth., Regional Office, Denver, Colo., airport lighting, to M. A. Nelson Const. Co., 731 N. Main St., Sheridan.

★**B. C. Jericho Beach (Vancouver)**—AIR REPAIR DEPOT—Dpt. Natl. Defense for Air, Ottawa, Ont., temporary accommodation at No. 3 Repair Depot, to Smith Bros. & Wilson, Ltd., 1267 Richards St., Vancouver. $5?..000. Bids 5/26. CD 5/20.

★**B. C., Kitsilano (Vancouver)**—DEPOT—Dpt. Natl. Defense, Ottawa, Ont., temporary accommodation at No. 2 Equipment Depot, to Northern Constr. Co. Ltd. and J. W. Stewart, Ltd., 736 Granville St., Vancouver, **$782,000.**

Newfoundland, Botwood — WHARF — Dpt. National Defense for Air, Ottawa, Ont., pile wharf at air force station, to E. G. M. Cape & Co. Ltd., 620 Cathcart St., Montreal, Que. **$400,000.**

N. S., Deep Brook (Digby) — NAVAL TRAINING SCHOOL—Dpt. Natl. Defense for Sea, Ottawa, Ont., naval training school, to Dominion Constr. Co., Ltd., Webber Bldg., Digby, about **$175,000.**

★**N. S., Digby**—NAVAL BASE—Dpt. National Defense for Sea, Ottawa, Ont., naval base, to Dominion Constr. Co., Ltd., 217 Bay St., Toronto, Ont., about **$800,000.**

N. S. Sydney—AIR FORCE STATION IMPROVEMENTS—Dpt. Natl. Defense for Air, Ottawa, Ont., paving, surfacing roads at R.C.A.F. Station, to Standard Paving Maritime, Ltd., Capital Bldg., Halifax, **$27,000.**

Ont., St. Thomas—COAL DOCK—New York Central System, Wellington St. E., heavy timber reconstruction coal dock and part engine house, to Johnson Brothers Co. Ltd., 43 Market St., **$25,000.** J. E. Schwender, c/o owner, engr.

Que., Lauzon — IMPROVEMENTS — Davie Shipbuilding Co., Ltd., 29 Davie St., imprvs., plate shop, to Foundation Co. of Canada, Ltd., 1538 Sherbrooke St. W., Montreal, Que., $100,000. Hutchinson & Wood, 204 W. Notre Dame St., Montreal, archts.

LATIN AMERICA

Mexico—Dpt Federal Pub. Works, c/o E. Suarez, secy. Finance, Mexico City, plans several plants for manufacture ingredients for rubber processing. E. Fuller, Brownsville, Tex., consult. engr. Engineering Dpt. P. Wks., Mexico City, engr.

PUBLIC BUILDINGS

PROPOSED WORK

California—Housing Auth. of City of Richmond, 271 10 St., Richmond, soon lets contract bldgs., for NHA. C. I. Warnecke, Financial Center Bldg., Oakland, and A. F. Roller, Crocker 1st Natl. Bank Bldg., San Francisco, archts.

†Calif., Benicia—Farm Security Admin., 30 Van Ness Ave., San Francisco, soon lets contract moving, relocation trailer units, utility bldgs., clearing, grading, and sanitation, water distr., roads, paving, drainage sys. CD 4/1—ENR 4/9.

Calif., Gridley—Gridley Union High School Dist., rebuilding Gridley Union High School, 2 story, brick.

†Calif., Salinas—Monterey Co., Courthouse, plans by R. Stanton & T. B. Mulvin, Del Monte Hotel. Del Monte, hospital addn. and isolation bldg., combined heating plant and laundry bldg. at Monterey Co. Hospital. $330,000. **FWA.**

★**†Calif., Vallejo** — City, plans by Douglas Dacre, 381 Bush St., San Francisco, 1 story community hospital, facilities, $1,000,000. **FWA.**

†Connecticut—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., demountable housing. $350,000.

†Florida—U. S. Eng., Postoffice & Courthouse, Jacksonville, bldgs., Jax-42-116.

★**†Illinois**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. $500,000. H. K. Ferguson Co., Hanna Bldg., Cleveland, O., archt. and engr.

★**Ind., Hammond**—Bd. Educ., 3 story technical high school, Columbia and Standard Aves. $700,000. Postponed for duration. L. C. Bernard, 7241 Forest St., archt. CD 7/2—ENR 7/10.

†North Carolina—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Atlanta, Ga., housing.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**North Carolina**—Pub. Housing Auth., NHA. Georgia Savings Bank Bldg., Atlanta, Ga., housing.

★†**North Carolina** — Wilmington Housing Auth., Wilmington, plans by Lynch & Foard, 202½ Princess St., Wilmington, housing, for NHA. $2,000,000-$3,000,000. J. N. Pease & Co., Johnston Bldg., Charlotte, engrs.

★†**Ohio**—Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa., mill. $22,000,000. Federally financed.

★†**Ohio** — Industrial Company, mfg. plant. $20,000,000. McGeorge & Hargett, 9400 Quincy Ave., Cleveland, engrs. Defense Plant Corp. will finance.

†**Oklahoma** — U. S. Eng., Citizens Bank Bldg., Denison, Tex., addnl. bldgs., facilities.

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, bids soon, exten. bldgs., utilities, etc. $200,000. Plans deposit $30.

★†**Pennsylvania**—U. S. Eng., Chimes Bldg., Syracuse, N. Y., expanding plant. Over $3,000,000.

Pa., Franklin—J. G. Bohlender, mayor, electric light and power plant. Over $150,000. J. Snow, city engr.

†**Rhode Island**—Federal Works Agency, 18 and F Sts., Wash., D. C., altering bldgs.

Tenn., Nashville—Bd. Educ., plans by Freeland & Roberts, 3rd Natl. Bank Bldg., rebuilding Warner School, destroyed by fire. $150,000.

★†**Texas**—Bureau Mines, Interior bldg., E St. between 18 and 19 Sts. N.W., Wash., D. C., plant addn. $1,000,000. CD 6/3—ENR 6/11.

†**Texas**—Fort Worth Housing Auth., plans by C. O. Chromaster, 401 Century Bldg., Fort Worth, and bids soon housing, Tex. 4-14, for NHA. $250,000.

★†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, bldgs., utilities, appurtenances. $2,000,000.

★†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, bldgs., facilities, etc. $2,000,000.

★†**Texas**—U. S. Eng., Cotton Exchange Bldg., Dallas, bldgs. $2,000,000.

†**Texas**—U. S. Eng., Federal Bldg., Galveston, bldgs., facilities. $300,000. P. H. Hemphill 1207 Enfield Rd., Austin, and J. Montgomery, Littlefield Bldg., Austin, engrs.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs. $300,000.

†**Texas**—U. S. Eng., Fort Sam Houston, did not open bids July 3, bldgs., sanitary sewerage sys., steam distributing lines, water supply, Spec. 42-146 (T6-1). CD 6/25.

†**Texas**—U. S. Eng., Federal Bldg., Galveston, addnl. bldgs.

Tex., Terrell—Terrell State Hospital, Terrell, rejected bids ward hospital. S. W. Bliss, Nixon Bldg., Corpus Christi, archt.

†**Wash., Oak Harbor**—Federal Works Agency, Alaska Bldg., Seattle, Bids late in August, hospital, Docket 45-200. $151,400. **FWA.**

†**Wash., Vancouver**—School Dist. 37, received no bids June 29, Shumway Junior High School addns. **FWA** 45-182. $100,000. CD 6/12—ENR 6/18.

★**Wyo., Laramie**—E. W. Waddleton, city clk., $1,500,000 bond election July 28. light plant.

†**Pacific Northwest**—U. S. Eng., Textile Tower, Seattle, standby power plant.

N. S., Clementsport—Dominion Govt., Ottawa, Ont., remodeling present bldg., constructing exten. to house central units Naval Training School. $150,000. Dpt. Naval Affairs, Ottawa, Ont., archt.

N. S., Inverness—Dominion Govt., Ottawa, Ont., oil test plant, Lake Ainslie. $50,000. Dpt. Munitions & Supply, Ottawa, Ont., engr.

N. S., Windsor—Dominion Govt., Ottawa, Ont., plans by Dpt. National Defense, Ottawa, Ont., barracks, etc., frame, concrete fdns. $300,000.

Ont., Agax — Wartime Housing, Ltd., 55 York St., Toronto, 100 single family dwellings. $285,000.

Ont., Hamilton—Wartime Housing Ltd., J. M. Pigott, pres., 55 York St., Toronto, bids soon women's commercial center, Barton St. E. near Sherman Ave.

Ont., Ottawa—Secy. Dpt. Pks., Ottawa, bids soon women's hostel, Queen St. corner Metcalfe St. $200,000. C. D. Sutherland, c/o owner, archt.

Ont., Ottawa—Secy. Dpt. P. Wks., Ottawa, bids soon temporary war bldg., Mann Ave. $400,000.

★**Ont., Toronto**—Govan, Ferguson & Lindsay, archts., 515 Jarvis St., bids soon hospital addn., for Wellesley Hospital, Homewood Pl. $500,000.

Que., Brownsburg—Wartime Housing, Ltd., 55 York St., Toronto, 50 dwellings. $150,000.

Que., Lac Edward—Province of Quebec, Dpt. Health, Quebec City, plans by W. Lacroix, 132 St. Peter St., Quebec City, 3 story, basement, 53x355 ft. sanatorium. $400,000.

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PUBLIC BLDGS. (Continued)

BIDS ASKED

Bids Asked July 20

†**New Jersey**—Long Branch Housing Auth., 188 Garfield St., Long Beach, housing, NJ-8-2. for NHA. $414,000. Extended date. CD 6/23—ENR 6/25.

Bids Asked July 24

★†**Pennsylvania**—Washington County Housing Auth., housing, Project Pa. 17-2. $711,-900. C. P. Brosch, 195 9 St., Monaca, landscape archt. C. C. and E. E. Compton, 4 Ave and Thompson St., Donora, and Norman B. Kuhns, 5 Ave., McDonald, archts. Alexander Dzubay, 74 N. Fremont Ave., Pittsburgh, engr. CD 12/10—ENR 12/18.

Bids Asked July 31

†**Conn., New London**—Lawrence Memorial Hospital, Ocean Ave., hospital, Conn, 6-122. $346,725. **FWA.** CD 3/27—ENR 4/2.

Bids Asked August 7

★†**Kansas**—U. S. Eng., Albuquerque, N. M., military housing.

Bids Asked August 28

†**Pennsylvania**—Pub. Housing Auth., NHA, 279 Bway., New York, N. Y., housing, Pa. 36265. Zantzinger & Borie, Archt'a. Bldg., 17 and Sanson Sts., Phila., archts.

Bids Asked August 31

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., housing, Pa. 36264. Gleeson & Mulrooney, 1612 Market St., Phila., archts.

Bids Asked

†**Arizona**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., base engineering, maintenance and inspection bldgs. Plans deposit $25.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, open storage sheds, bldgs., Inv. 509-42-523. Plans deposit $25.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., Jax 42-115.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., Jax 42-118.

†**New Mexico**—U. S. Eng., Albuquerque, bldg. $100,000.

†**Texas**—U. S. Eng., Albuquerque, N. M., bldgs. $150,000.

†**Tex., Amarillo** — U. S. Eng., Fort Sam Houston, military housing. $150,000.

LOW BIDDERS

★†**Arkansas**—U. S. Eng., P. O. Box 97, Memphis, Tenn., modification school bldg. for office use, to C. A. Struck & Sons, Jonesboro. Est less than **$1,000,000.**

†**California**—U. S. Eng., Wright Bldg., Sacramento, July 8, bldgs., Spec. 118, from Thomas C. Buck, 250 E. Cleveland St., Stockton, **$214,500.**

★†**Kansas**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., housing, Kan. 14024, to A. H. Brodkey Co. and Associated Contractors, 611 Brandeis Theatres Bldg., Omaha, Neb. Total est. over **$5,000,000.** CD 6/16—ENR 6/18.

†**Maryland**—Farm Security Admin., drug and food stores management and maintenance bldgs., from Tester-Gillies, Inc., 1427 I St. N.W., Wash., D. C. **$69,898.**

★†**Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., warehouse, from Leimback & Williams, 30 W. Biddle St., Baltimore. Est. less than **$500,000.**

†**North Carolina**—U. S. Eng., 308 U. S. Customhouse, Wilmington, July 8, military housing, from Wheatley & Mobley, Augusta, Ga.; bldgs., from Triangle Constr. Co., Durham, and Woodcrest Const. Co. Inc., & Rosoff Bros. Inc., 369 Lexington Ave., New York, N. Y.

†**North Carolina**—U. S. Eng., Fort Bragg, July 9, expansion bldgs., from L. B. Gallimore, Greensboro.

★†**Ohio**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., June 26, housing, Project Ohio 33112, from Benjamin Chermers Co., 111 W. Washington St., Chicago, Ill. **$820,616.** Est. $800,000. CD 5/26—ENR 5/28.

†**South Carolina**—U. S. Eng., Camp Croft, July 3, bldgs., from Van Winkle & Watkins Co., Peters Bldg., Atlanta, Ga.

†**Texas**—U. S. Eng., Ft. Sam Houston, June 27, from George P. O'Rourke, 2019½ Jackson St., Dallas, housing, **$236,000;** water lines, **$23,300;** sanitary sewer collecting lines, **$36,-600.** Spec. 42-140.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-140, from Geo. P. O'Rourke, 2019½ Jackson St., Dallas. CD 6/23.

†**West Virginia**—Pub. Housing Auth., NHA, Temporary Bldgs., 1961 D St. N.W., Wash., D. C., July 3, housing, Project W. Va. 46023, from Baker & Combs, Inc., Morgantown, **$361,900.** CD 6/12—ENR 6/18.

CONTRACTS AWARDED

★†**Alabama**—Tennessee Valley Auth., Knoxville, Tenn., housing, Projects Ala. 1054, Ala. 1055 and Ala. 1056, to John[illegible] & Willard, Inc., Knoxville, Tenn. Est. $[illegible],947. Bids 6/22. CD 7/1—ENR 5/28.

★†**Arkansas**—Pub. Housing [illegible]th., NHA, Electric Bldg., 7 and Tay[illegible] Sts., Fort Worth, Tex., housing, site prep[illegible]ation, grading, streets, walks, utilities, [illegible] Gregory-Hogan, 115 N. Spring St., Little Rock. Est. under **$3,000,000.** Erhart & Eich[illegible]aum, General Bldg., Little Rock, archts.

★†**California**—Industrial Co[illegible]y, bldgs., to Chas. I. Hoskins, 1764 Kett[illegible] Blvd., San Diego. **$1,100,000.** Federally financed.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, military housing, to Matthew A. Little, 1 Gra[illegible] View Ave., San Francisco, under **$1,000,000.** Awarded 7/6.

★†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldgs., to W. C. Akard, 225 Cervantes Blvd., San Francisco, under **$1,000,000.** Awarded 7/9.

†**Connecticut**—Industrial Company, factory unit, to W. J. Megin, Inc., 51 Elm St., Naugatuck. Est. over **$40,000.** Federally financed. CD 6/18—ENR 6/25.

★†**D. C., Wash.**—Pub. Bldgs. Admin., C St. between 18 and 19 Sts. N.W., Wash., D. C., temporary office bldg., No. T-8, to Skinker and Garrett, 1719 I St. N.W., Wash., D. C. **$860,000.**

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, addnl. bldgs., to J. L. Ewell Const. Co., Lakeland, under $500,000.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, addnl. bldgs., to Palmer Eng. Co., Cassatt Ave., Jacksonville.

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., to Sprague Const. Co., Sarasota***to Cleary Bros. Const. Co., Georgia Ave., West Palm Beach***to Edelbert Const. Co., Ft. Meyers***to R. A. Bowen, Macon, Ga.***to G. A. Hanson, 1st Natl. Bank Bldg., Tampa***to Stevens & Sipple, Orlando***to J. M. Bray, Valdosta, Ga., each contract for less than **$1,000,000.**

★†**Georgia** — U. S. Eng., Postoffice Bldg., Savannah, addnl, bldgs., to Claussen-Lawrence Const. Co., Augusta. Over $500,000. Merry & Parsons, SFC Bldg., Augusta, archts.

†**Georgia** — U. S. Eng., Postoffice Bldg., Savannah, recreational bldg., to Farquhar-MacRae, Arcade Bldg., Savannah, about **$200,-000.**

★†**Georgia**—U. S. Eng., Courthouse & Postoffice, Jacksonville, Fla., bldgs., to J. M. Bray Co., Valdosta, less than **$1,000,000.** Awarded 6/30.

†**Georgia**—U. S. Eng., Postoffice Bldg., Savannah, addnl. bldgs., to Newman Const. Co., LaGrange.

†**Illinois**—War Dpt., 20 St. and Constitution Ave. .W., Wash., D. C., cold storage bldg. addn., to Superior Constr. Co., 1914 W. Superior St., Chicago.

†**Illinois**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., storage bldgs., to Lindquist Const. Co., Dixon.

★†**Indiana**—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., shop, to Strom Constr. Co., 452 Houseman Bldg., Grand Rapids, Mich., less than **$1,000,000.**

†**Kansas**—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., converting stables into garages, to J. T. Constant, Lawrence, **$275,929.** Howard-Needles-Tammen & Bergendoff, rear Leslie Bldg., 1012 Baltimore St., Kansas City, Mo., archts.

★†**Kansas**—U. S. Eng., Wright Bldg., Tulsa, Okla., to Oscar L. Boyington, W. E. Price Constr. Co., 695½ Main St., and Ellis, Nicholson, Cramer, Inc., Hightower Bldg., all in Oklahoma City, Okla., bldgs., **$1,260,000;** sanitary sewer collecting lines, facilities, **$85,-000;** sewage disposal plant, **$120,000;** water distr. lines, **$71,000;** grading, **$90,000,** all Inv. 857-42-270. Grand total $1,626,000. Bids 6/10.

★†**Kansas**— U. S. Eng., Davidson Bldg., Kansas City, Mo., bldgs., to B & W Constr. Co., 307 N. Michigan Ave., Chicago, Ill. Total est. over **$1,000,000.**

★†**Kentucky**—U. S. Eng., P. O. Box 59, Louisville, bldgs., to Sherry-Richards Co., 201 N. Wells St., Chicago, Ill., approx. **$1,500,000.** CD 5/27—ENR 6/4.

★†**Kentucky**—U. S. Eng., 612 Federal Bldg., Louisville, 1 story bldg., to H. Kaplan Co., 751 N. Pauline St., Chicago, Ill. over **$1,000,000.**

†**Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, bldgs., Inv. 607, to Rabalais & Murphy, 214 S. 12 St., Baton Rouge. Bids 7/6, awarded 7/8. CD 7/1.

†**Maine**—U. S. Eng., Park Square Bldg., Boston, Mass., temporary military housing, to Rossano Constr. Co., Inc., 579 Bennington St., East Boston, Mass.; tank and pump works, to F. W. Goldthwait, 274 Franklin St., Boston, Mass. Est. **$150,000.**

★†**Maryland** — U. S. Eng., Standard Oil Bldg., Baltimore, military housing, to Harry T. Horst Constr. Co., Pottsville Pike, Reading, Pa. Est. less than **$500,000.** CD 5/1—ENR 5/7.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Massachusetts**—U. S. Eng., Park Sq. Bldg., Boston, bldgs., Proj. 421, to J. J. Powers Co., 238 Main St., Cambridge.

†**Massachusetts**—U. S. Eng., Park Sq. Bldg., Boston, bldgs. GD 44, to J. J. Powers Co., 238 Main St., Cambridge.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, hospital, No. 176-43-NEG-1, to Frankini Constr. Co., 30 Mystic Ave., Medford. Bids 7/7.

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, bldg., to Steinle-Wolfe, Inc., Freemont, O., less than **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, rehabilitation industrial plant, to Barton-Malow Co., 2631 Woodward Ave., Detroit, less than **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, bldgs., to Owen-Ames Kimball Co., 38 Pearl St. N.W., Grand Rapids, less than **$1,000,000.**

†**Minnesota**—U. S. Govt., Commodity Credit Corp., The Mall between 12 and 13 Sts. S.W., Wash., D. C., grain storage bins, to L. R. Dickinson, Bemidji. **$100,000.**

Minn., Springfield—A. C. Mueller, city clk., imprv. municipal light and power plant, to William Brothers Boiler & Mfg. Co., Nicollet Island, Minneapolis, 3 drum boiler at **$53,668.** Bids 5/18. CD 4/29—ENR 5/7.

†**Mississippi**—U. S. Eng., Courthouse, Mobile, Ala., military housing, Inv. 569-42-786, to Joseph G. Day & Son, 2400 5 Ave. S. and Harrison Richardson, 431 S. 24 St., both Birmingham, Ala. Awarded 7/8.

★†**Mississippi**—**Pub. Housing Auth., NHA,** Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., housing, to E. L. Bruce Co., Thomas St., Memphis, Tenn. Est. less than **$1,000,000.** Landry & Mathes, Hattiesburg, archts.

★†**Missouri**—Industrial Company, plant imprvs., to H. B. Deal & Co., Inc., 1218 Olive St., St. Louis. Est. **$3,000,000.** Federally financed. Albert Kahn Associate Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Mich., archt.

★†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, bldgs., to Inter-State Const. Co., Ridge Bldg., Collins Const. Co., Davidson Bldg. and Universal Const. Co., Scarritt Bldg., Kansas City, Mo., **$1,849,213.** CD 4/30—ENR 5/7.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, storage to Hagstrom Const. Co., 490 Snelling Ave. N., St. Paul, Minn.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, bldgs., to Tarlton & MacDonald Const. Co., 3829 W. Pine Blvd., St. Louis, Mo.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, bldgs., to Tillotson Constr. Co., 1215 Jones St., Omaha.

★†**Nebraska**—U. S. Eng., 1790 Jackson St., Omaha, military housing, to C. C. Larsen & Sons Co., 10 N. Main St., Council Bluffs, Ia., **$890,482.** CD 5/1—ENR 5/7.

†**Nevada**—U. S. Eng., 751 S. Figueroa St., Los Angeles, warehouse, to O. J. Scherer, 209 S. 3 St., Las Vegas. Est. over **$40,000.** Awarded 7/9.

†**New Mexico**—U. S. Eng., temporary bldgs., Inv. W-911-42-168, to Lee Moor & T. W. Hansen, Bassett Tower, El Paso, Tex., approx. **$360,000.** CD 6/16.

★†**New York**—Industrial Company, plant, to James Stewart & Co., 230 Park Ave., New York. **$750,000.** Defense Plant Corp. will finance. (**Correction**—contractor's name and address.) CD 6/30—ENR 7/2, under CA.

★†**New York**—Pub. Housing Auth., NHA, 250 Bway., New York, housing, Project 30102, to Duplex Constr. Co., Glens Falls. **$897,800.** CD 6/18—ENR 6/25.

★†**New York**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., facilities, NOY 5650, to John W. Cowper, Inc., Sidway Bldg., Buffalo, and Senior and Palmer, Inc., 50 Church St., New York, **$13,200,000.**

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, bldgs., to P. S. West Constr. Co., Statesville.

★†**Ohio**—Industrial Company, plant, to Alger-Rau, Inc., 12434 Cedar Rd., Cleveland. Est. **$3,000,000.** Defense Plant Corp. will finance. Bids 6/29, awarded 7/3. R. F. McDowell, Chester Bldg., Cleveland, engr. CD 6/24.

†**Ohio**—Industrial Company, factory, etc., to Dean W. Rankin, 1836 Euclid Ave., Cleveland, est. **$200,000.** Awarded 7/3. Christian, Schwarzenberg & Galde Co., 1836 Euclid Ave., Cleveland, engrs. Defense Plant Corp. will finance. CD 6/24.

★†**Ohio**—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., shop, to Darin & Armstrong, Inc., 2041 Fenkel, Detroit, Mich., less than **$1,000,000.**

†**O., Warren**—Warren City Hospital, west wing addn., Docket Ohio 33-115, to Mastran Const. Co., 1613 Ohio Ave., Youngstown. **$165,688. FWA.** CD 1/30—ENR 2/5.

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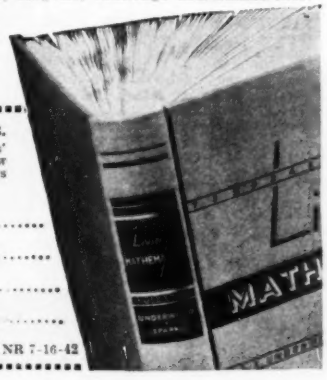

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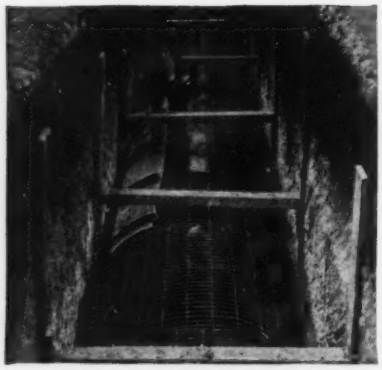

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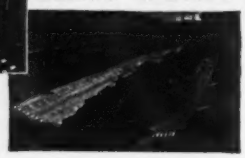

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†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, housing facilities, grading, site development, No. 957-42-209, to Cowen-Norton Const. Co., Shawnee, Okla., **$375,000.** Bids 4/20, Awarded 7/4. CD 4/8.

★†**Pennsylvania**—Industrial Company, design and construction power plant, to Gibbs & Hill, 450-7 Ave., New York, N. Y. Est. over **$5,000,000.** Defense Plant Corp. will finance. CD 5/25—ENR 5/28.

★†**Pennsylvania**—U. S. Eng., Federal Bldg., Pittsburgh, general contract military housing, to Mellon Stuart Co., 210 East Park Way, Pittsbugh. Est. over **$3,000,000.** Gannett, Eastman & Fleming, 600 N. 2 St., Harrisburg, engrs. and archts. CD 6/29—ENR 7/2.

★†**Pennsylvania**—**Yards & Docks, Navy Dpt.,** 18 and Constitution Ave. N.W., **Wash.,** D. C., bldg., NOY 5472, to John H. Wickersham, John H. Swanger and Tilghman Moyer Co., 141 N. 9 St., Allentown. **$500,000.**

†**South Carolina**—U. S. Eng., Camp Croft, addnl. work, to Van Winkle and Watkins, 275 E. Paces Ferry Road N.E., Atlanta, Ga.

S. C., Columbia—South Carolina State Hospital for Insane, Dr. C. F. Williams, supt., 6 brick bldgs., 2 at State Park, near here, and 4 on State Hospital Grounds, to General Constr. Co., Columbia Record Bldg., **$359,000.** Bids 7/9. CD 7/1.

★†**Tennessee**—U. S. Eng., 406 Courthouse, Nashville, bldgs., to W. F. Holt & Sons, 105 16 Ave. S. and Boone Contg. Co., 3rd Natl. Bank Bldg., Nashville. Est. less than **$3,000,000.** CD 6/30. Bids 7/4.

★†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, bldgs., to M. T. Reed Constr. Co., Clarksville, less than **$1,000,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-134, to B. B. Smith and Baldwin & Sheet Co., 1805 Donaldson Ave., San Antonio. Approx. **$470,000.** Awarded 7/3.

†**Texas**—U. S. Eng., Fort Sam Houston, military housing, to F. C. Barnes, Brownsville, approx. **$169,000.**

★†**Texas**—Industrial Company, design and construction plant unit, to Stone & Webster Eng. Corp., 49 Federal St., Boston, Mass., **$12,000,000.** Defense Plant Corp. will finance. Additional to CD 6/3—ENR 6/11, under CA.

★†**Texas**—U. S. Eng., Masonic Bldg., Amarillo, bldgs., to Orshek & Christensen, Fremont, Neb. **$680,000.** Bids 6/26.

★†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, plant, to Russell J. Bryden & Co., and Cedric Burgher Co., 3027 Main St., Dallas, approx. **$1,400,000.** CD 3/25—ENR 4/2.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-133, to P. E. Garrett Const. Co., Bay City, **$150,000.**

†**Tex., Brownwood** — Independent School Dist., c/o E. J. Woodward, supt., Junior High School, Tex. 41-147, to L. W. Wentzel, Sherman. **$156,783. FWA.** Bids 7/3. CD 6/26—ENR 1/15.

★†**Utah**—U. S. Eng., 32 Exhange Pl., Salt Lake City, bldgs., storage facilities, to Jacobsen Constr. Co., 724 S. 3rd East St., Salt Lake City, **$620,477.** Bids 6/6.

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, bldgs., to Ellis Barker, Ness Bldg., Salt Lake City, **$180,720.** Bids 6/26.

★†**Virginia**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bldgs., bulkhead, wharf, NOY 5616, to Allen J. Saville, Inc., Electric Bldg., Richmond, **$1,000,000.**

†**Wisconsin**—Globe-Union, Inc., 900 E. Keefe Ave., Milwaukee, factory addn., to Belzer-Ornst Co., 6222 W. State St., Wauwatosa. Federally financed. Geo. Schley & Sons, 735 N. Water St., archt.

★†**Wisconsin**—U. S. Eng., 408 Federal Bldg., Milwaukee, bldgs., to Starrett Bros., Inc., 8 S. Dearborn St., and Michael Pontarelli & Sons, 4248 N. Kilpatrick St., both Chicago, Ill.***electric wiring, to John W. Dreslin Co., Chicago, Ill.***stripping overburden and delivering 550,000 tons gravel, to Dean Ekstrom & Co., Superior***precast concrete general purpose outfall sewer and main sanitary interceptor sewer, to E. M. Rocho, Freeport, Ill. Bids 6/24, 6/22 and 6/18.

†**Wisconsin**—U. S. Eng., Federal Bldg., Milwaukee, bldgs., to Bentley Constr. Co., 4022 N. Port Washington Rd., Milwaukee. Bids 6/23. CD 6/19.

Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, coating houses, to Wolfes-Jensen Co., 127 N. Dearborn St., Chicago, Ill.

Alta., Calgary—Dpt. Natl. Defense, Ottawa, Ont., addnl. stores accommodation. Equipment Depot 11, to Buchan Const. Co. Ltd., 1306 11 Ave. W., **$157,000.**

N. S., Bedford—Dpt. Munitions & Supply, Ottawa, Ont., buildings, to Brookfield Const. Co. Ltd., 169 Hollis St., Halifax, **$260,000.**

N. S., Halifax—Dpt. National Defense for Sea, Ottawa, Ont., shipwright's shop, to Fundy Const. Co. Ltd., Russell and Islesville Sts.,

N. S., Halifax—Wartime Housing Ltd., 25 York St., Toronto, Ont., addnl. 158 family dwellings at Halifax airport and Highland Park, to Brookfield Constr. Co. Ltd., 169 Hollis St., about **$315,000.**

Ont., Ottawa—Dpt. P. W., Ottawa, 1 story, 50x50 ft., rein.-con. Government office block, Slater St., to Doran Const. Co. Ltd., 78 Bank St., about **$275,000.** CD 6/29—ENR 7/9.

Ont., Pickering—Wartime Housing Ltd., 25 York St., Toronto, 100 addnl. houses, to John Maguire Contg. Co. Ltd., 24 St. Birch Ave., Toronto. about **$200,000.**

Que., Sorel—Wartime Housing, Ltd., 25 York St., Toronto, Ont., 100 dwellings, to Cottingham Supply Co. Ltd., 28 Bethany St., Lachute, **$350,000.**

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Orinda—Netherlands Shipping Commission, 29 Bway., New York, N. Y., Lieut. Comdr., M. S. Wytema and Lieut. N. F. Detroo, representatives, Royal Netherlands Navy, San Francisco, Calif., plans by F. H. Slocombe, 132 Monte Cresta Ave., Oakland, altering existing residence, constructing large dormitory, recreation room for European crew members, and dormitory, kitchen, etc. for crew members who are natives of Netherlands Govt., to be known as Rest Haven, on J. P. Miller estate, San Pablo Dam Rd.

Conn., Bridgeport—D. Cerreta, 737 Seaview Ave., plans by C. F. Davis, 83 Fairfield Ave., frame homes. $150,000.

Pa., Ambridge—Dixon Bros., Wm. Dixon in charge, Salem Rd., Mt. Lebanon, Pittsburgh, eighty-two 2 story, bsmnt., brick houses.

Pa. Yeadon (br. Lansdowne) — Fitzgerald Mercy Hospital Ave., Lansdowne Ave. and Bailey Rd., plans by H. D. Daget & Son, 1125 Race St., Phila., nurses home and school bldg.

Wash., Seattle—G. Strumme & Son, 2261 California Ave., 36 houses, Delridge Way, Highland Park Dist. $150,000.

B. C., Prince Rupert—Y. M. C. A., Prince Rupert, bids soon YMCA bldg., 1 Ave and McBride St., $150,000.

Ont., Willisville—International Nickel Co. of Canada, Ltd., Copper Cliffe, workmen dwellings. $150,000.

Ont., Windsor—Metropolitan Hospital Bd., 14 Lens Ave., plans by J. C. Pennington, Commerce Bank Bldg., nurses residence, school. $150,000.

Que., St. Martin—L. Parent, archt., 39 Cornwall Ave., Mount Royal, and Marc Cinq, Mars, archt., 60 St. James St. W., Montreal, bids soon, church, for Parish of St. Martin. $150,000. CD 5/27.

CONTRACTS AWARDED

★**Calif., Long Beach**—S. M. Taper, c/o contractor, two hundred one 5 room dwellings, 2100 and 2200 blocks, E. 65 and St. Louis Sts., to Biltmore Homes Inc., 6160 Atlantic Ave., Long Beach, **$500,000.**

Calif., Los Angeles—Southwest Homes, Inc., 5200 W. 115 St., 96 single family and 17 triplex dwellings 115 and 116 Sts. Owner builds. Over **$150,000.**

Calif., Mill Valley—G. Goheen Constr. Co., Sycamore at Highway, Mill Valley, 51 homes in Scott-El Cerrito tract, own forces. **$4,500** ea.

Calif., San Leandro—Sterling Homes Co., 111 E. 14 St., 1 story, frame duplex residences, to C. P. Pond, 111 E. 14 St. Est. **$150,000.**

Calif., Sunnyvale—David Bohannon, 1182 Market St., San Francisco, 63 (ultimately 212) homes, Pacific Homes Tract. Owner builds. **$252,000.**

Calif., Venice—Homes at Wholesale, 6000 W. Manchester Ave., Los Angeles, seventy-eight 5 and 6 room dwellings, frame and stucco, to J. Paul Campbell, 5601 W. Manchester Ave., Los Angeles, **$277,500.**

Conn., Bristol—Pellillo Constr. Co., 16 E. Cedar St., Mt. Vernon, N. Y., 50 frame houses. Owner builds. **$175,000.** J. Clyde, 21 N. 3 Ave., Mt. Vernon, N. Y., archt.

Conn., East Hampton—Princess Pocotopaug Development Co., Route 6A, Lake Pocotopaug, East Hampton, T. J. Cabelus, B. A. and J. Cooper, interested, cottages, cabins, roads, etc., Princess Pocotopaug Park. Owner builds. **$150,000.**

Ill., Elmhurst—York Home Builders, 209 W. Jackson Blvd., Chicago, 82 homes, Elmhurst Park, separate contracts. **$400,000.**

Que., Quebec City—Maurice Pollack, Ltd., 75 St. Joseph St., store addn., to E. Frenette, 75 St. Lawrence St., Quebec City. Est. **$250,000.** CD 4/17—ENR 4/30.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Taft—SHOP—Standard Oil Co., 225 Bush St., San Francisco, rebuilding shop destroyed by fire. $150,000.

Connecticut — PLANT — Vought-Sikorsky Div. United Aircraft Corp., 550 Main St., Stratford, remodeling plant. Over $40,000.

La., St. Francisville—PLANT—Warriner Starch Plant, c/o D. Warriner, St. Francisville, sweet potato dehydrated plant. $50,000.

Md., Relay—PLANT—Calvert Distilling Co., Relay, Md., soon lets contract, 1 story, 100x170 ft. regaging bldg. $75,000.

Massachusetts — PLANT — Bethlehem Steel Co., E. Howard St., Quincy, soon lets contract, altering, constructing plant exten., constructing hack saw bldg., addn., alterations Q Bldg. $40,000.

N. Y., New York—SHOP—New York, New Haven & Hartford R.R. Co., Grand Central Terminal, N. Y., 1 story repair shop, 132 St. and Cypress Ave. $40,000. Herbert O. Weigand, c/o owner, archt.

Nev., Las Vegas—WAREHOUSE—Las Vegas Transfer & Storage Co., 107 S. Main St., rebuilding warehouse and paint storage bldg. $65,000 fire damage.

Nev., Las Vegas—PLANT—Rancho Grande Creamery Co., 406 S. 2 St., rebuilding interior creamery plant. $60,000 loss.

★**N. C., Morganton**—PLANT—National Carbon Co., Inc., 30 E. 42 St., New York, N. Y., metallurgical and chemical plant, 48 acre tract selected. $6,000,000.

O., Cincinnati—ENGINEERING, etc.—Cincinnati Bickford Tool Co., A. Tuechter, pres., 3220 Forrer Ave., Oakley, engineering, administration and office bldg. $275,000.

O., Wooster—FACTORY—Gerstenslager Co., Wooster, 1 story, brick, steel, concrete factory addn., E. Bowman St. $40,000.

Ore., Corvallis—MILL—Valley Milling Co., Corvallis, rebuilding flour mill, destroyed by fire. $40,000.

Pennsylvania — FACTORY — Federal Fdry. & Supply Co., R. Ditty, pres., 4600 E. 71 St., Cleveland, O., brick factory. $40,000. H. M. Morse Co., 1500 E. Superior Ave., Cleveland, engrs.

Pa., Phila.—PLANT—Metlab Co., 1000 East Mermaid Lane plans by W. H. Lee, Schaff Bldg., altering and plant addn.

R. I., Bristol — PLANT — Bristol Frocks, Franklin St., brick plant, Franklin St. $40,000.

R. I., Cranston (br. Providence)—PLANT—Fire Safe Builders Products Corp., Mill St., 1 story, 170x288 ft., frame, concrete plant.

R. I., Bristol — PLANT — Bristol Frocks, Worsted Co., 153 Hamlet Ave., plans completed by Walter F. Fontaine, Inc., 285 Main St., brick, textile factory addn. $40,000.

★**Texas — PLANTS — Anglo American Trading Corp., c/o W. B. Hatch, 90 Broad St.,** New York, N. Y., plants.

Wis., Racine — FACTORY, etc. — Webster Electric Co., Clark St. and DeKoven Ave., plans by N. Ronneberg Co., engr. and archt., 3906 North Harlem Ave., Chicago, Ill., 2 story, 60x80 ft. factory-office bldg.

★**Wyo., Cheyenne** — REFINERY — Frontier Refining Co., Cheyenne, refinery addn. $4,000,000.

B. C., New Westminster—MILL—Jones Lake Logging Co. Ltd., 713 Columbia St., saw mill, shingle mill, shook and box mill. $50,000.

B. C., Vancouver—MILL—Pacific Coast Spar Co. Ltd., 610 Jervis St., saw, shingle, pulp mill.

B. C., Vancouver—MILL—Port Hardy Mills Ltd., 640 Hastings St. W., lumber mill, saw mill, etc.

B. C., Vancouver—MILL—Sound Mills Ltd., 911 Dominion Bank Bldg., sawmill, shingle mill and allied plant construction.

B. C., Vancouver—MACHINE SHOP—Vancouver Engineering Wks., Ltd., 519 W. 6 Ave., bids soon 20x150 ft. machine shop addn. $85,885.

B. C., Vancouver—PLANT—Neon Products, Ltd., 260 Terminal Ave., plant exten. $100,000.

B. C., Vancouver—SAW MILL—Haney Mills, Ltd., 1009 Credit Fancier Bldg., saw mill, etc. $40,000.

Man., Winnipeg—GARAGE—Manitoba telephone System, 166 Portage Ave. E., plans by A. Melville, Telephone Bldg., garage repair shop. $40,000.

N. S., Berwick — PLANT — Berwick Fruit Products Ltd., Berwick, altering, constructing canning plant exten.

N. S., Fraser's Mills—SAW MILL—MacDonald Bros. Frasers Mills, saw mills, etc.

Ont., Belleville—PLANT—W. A. Watson, archt., 266 Front St., bids soon 1 story, 60x150 ft. plant for Reliance Aircraft & Tool Co., Ltd., Water St. $70,000. CD 4/28—ENR 4/30.

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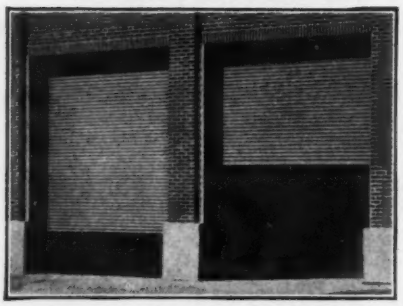

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Ont., Belleville—PLANT—Reliance Aircraft & Tool Co., Ltd., 7 Water St., plans by W. A. Watson, 266 Front St., Belleville, Ont., 60x150 ft. plant addn.

Ont., Burlington—PLANT—Burlington Parachute Co. Ltd., c/o R. B. Law, atty-at-law, Welland, plant. $40,000.

Ont., Chatham — PLANT — Spencer Stone, Ltd., 124 E. King St., plant. $40,000.

Ont., Cornwall—PLANT—Stormont Chemicals Ltd., c/o K. F. MacKenzie, 80 W. King St., plant. $40,000.

Ont., Elmira—PLANT—Naugatuck Chemicals Ltd., Elmira, bids soon, plant, installing equip. $130,000.

Ont., Galt — PLANT — Dominion Wheel & Foundries, Ltd., 21 George St., plant addn. $40,000. Architect, c/o R. Holland, 21 George St.

Ont., Hamilton—PLANT—Dominion Foundries & Steel Ltd., 14 Depew St., plant exten. $150,000. C. D. Howe Co., Ltd., P. U. Bldg., Port Arthur, engr.

Ont., Leaside (Toronto) — PLANT—Canada Wire & Cable Co. Ltd., Laird Dr., Leaside, bids soon, plant exten. $60,350. CD 4/28—ENR 4/30.

Ont., Merritton — MACHINE SHOP, etc. — Hayes Steel Products Ltd., Merritton, 2 story, 61x96 ft., rein.-con. machine shop and railway siding. $45,000. A. E. Nicholson, 46 Queen St., St. Catherines, archt.

★**Ont., Merritton** — PLANT — Hayes Steel Products, Ltd., Merritton, bids soon plant addn. $622,500 incl. equip. CD 6/29—ENR 7/2.

Ont., Niagara Falls—PLANT—Niagara Dry Beverages, Ltd., c/o W. S. Martin, atty.-at-law, Niagara Falls, plant. $50,000.

Ont., Oshawa—PLANT—Powles Engineering Ltd., c/o S. Cohen, 100 Adelaide St. W., Toronto, plant addn. $40,000.

Ont., Owen Sound—PLANT—Sterling Machine & Mfg. Co. Ltd., c/o G. Hindman, master mariner, Owen Sound, plant. $40,000.

Ont., Peterboro—PLANT—T. Pringle & Son, Ltd., engrs., 36 Toronto St., Toronto, soon lets contract 1 story plant addn., for Dominion Woolens & Worsteds, Ltd., 80 Richmond St. W. $46,000.

Ont., Sarnia—PLANT—Polymer Corp., Ltd., 320 Bay St., Toronto, plant. $75,000. H. G. Acres, Ltd., 2125 Culper St., Niagara Falls, engr.

Ont., Thorold—FACTORY — Ontario Paper Co., Ltd., Allanburg Rd., bids soon plant. $386,000. CD 7/10.

Ont., Thorold—PLANT—Ontario Paper Co., Ltd., 14 Allanbing Rd., plant addn. $100,000.

Ont., Toronto—PLANT—Johnston Industrial Plastics Ltd., c/o B. K. Johnston, 80 W. King St., plant. $40,000.

Ont., Toronto—PLANT—B. E. Laxer & Co., Ltd., 54 Wellington St. W., plant. $40,000.

Ont., Toronto—PLANT—Marani & Morris, archts., 46 Bloor St. W., bids soon, altering plant for Fairgrieve & Son, Ltd., 44 Dovercourt Rd.

Ont., Toronto—PLANT—Oil Distribution Appliances, Ltd., c/o P. N. W. Currie, 45 W. Richmond St., plant for manufacture tools, etc.

Ont., Weston—PLANT—Armstrong Door Co. Ltd., Weston, woodworking plant. $50,000.

Ont., Whitby—PLANT—Motcalf Foods, Ltd., Whitby, altering and constructing plant addn. $40,000.

Ont., Willisville—MINE HOUSE, etc.—International Nickel Co. of Canada, Ltd., 25 King St. W., Toronto, bids soon mine house and school Nipissing Dist. $117,500.

★**Ont., Windsor**—PLANT—J. P. Thompson, archt., 1191 Windmere Rd., soon lets contract, machine cutting tool plant, Walker Rd., for Colonial Tool Co., Ltd., 1857 Sandwich St. E. $135,000 building, $370,000 equip. CD 6/16—ENR 6/18.

Que., Montreal—PLANT—R.C.A. Victor Co. Ltd., 976 Lacarre St., plant exten. $70,000. W. K. G. Lyman, 2058 Victoria St., archt.

Que., Montreal—ROUNDHOUSE—Canadian National Rys., H. A. Dixon, ch. engr., 360 McGill St., soon lets contract, exten. 5 stalls of roundhouse, C.N.K. Turcot Yards. $45,000.

Que., St. Alexandre—FLAX MILL—Co-Operative Flax Co. Ltd., St. Alexandre, 2 story, bsmnt., brick, flax mill, concrete fdn. $40,000.

Que., Ville La Salle — STORAGE — Imperial Tobacco Co. of Canada, Ltd., 3710 St. Antoine St., Montreal, bids soon storage bldg. addn. $110,000.

Sask., Prince Albert — PLANT — Canada Packers, Ltd., Union Stockyards, Toronto, Ont., plant addn. Architect c/o R. G. Barton, St. Boniface, Man.

Sask., Taylorton—BOILER HOUSE—Dominion Electric Power Ltd., Estevan, boiler house addn. $40,000.

BIDS ASKED

Bids Asked Starting July 15

★**Illinois** — PLANT — Schmidt, Garden & Erikson, archts., 104 S. Michigan Ave., Chicago, 1 story plant, for Industrial Company. Over $1,000,000. H. [illegible] Maveety, 4 W. Jackson Blvd., Chicago, engr. CD 7/9.

Bids Asked About August 1

Ont., Windsor—PLANT—Sheppard & Masson, archts., 52 Chatham St. W., plant addn. for Bendix Eclipse of Canada, Ltd., 1472 Argyle Rd. $180,000.

Conn., Bridgeport — FACTORY — Bridgeport Brass Co., 30 Grand St., superstructure 2 story brick, steel factory, Walter and E. Main Sts. $250,000. Steel contract, to Englewood, N. J. Fletcher-Thompson Inc., 1336 Fairfield Ave., archts. G. S. Armstrong & Co., Inc., 52 Wall St., New York, N. Y. engrs. CD 6/30—ENR 7/2.

R. I., Bristol—PLANT—Bristol Mfg. Corp., Wood St. (invited bidders), brick plant, $40,000. J. E. Congdon, 26 President Ave., Providence, engr.

★**Tex., Houston**—PLANT—Columbian Carbon Co., 41 E. 42 St., New York, N. Y., plant, $550,000; installing 12 in. c.i. casinghead gas pipeline to connect with above plant, $60,000.

LOW BIDDERS

Md., Fairfield (Sta. Baltimore)—SERVICE, etc.—Industrial Company, July 1, three 1 story, cinder block service bldgs., 2 story frame office addn., from Leimbach & Williams, 30 West Biddle St., **$53,686.** CD 6/30—ENR 7/2.

CONTRACTS AWARDED

★**Ark., Stamps**—ELECTRIC GENERATING PLANT—Arkansas Power & Light Co., Simmons Natl. Bank Bldg., Pine Bluff, electric generating plant, to S. M. Dixon of Warren. Est. **$3,000,000.** CD 3/10—ENR 3/12.

Calif., Palo Alto — WAREHOUSE — Sutter Packing Co., Portage and 1 St., 1 story warehouse, to Wells P. Goodenough, 49 Wells Ave, **$45,149.**

Calif., Pittsburgh—FACTORY—Arcrods, Inc., Pittsburg, 1 story, mezzanine floor factory, to Alfred P. Fisher, 300 Montgomery St., San Francisco. Kaj Theill, 580 Market St., San Francisco, engr.

Calif., Richmond—PLANT—Wilson & Bennett Mfg. Co., 6532 S. Menard St., Chicago, Ill., steel plant, to R. E. Bartlett, 223 Wilamette Ave., Berkeley, and F. C. Hosking, 541 Civic Center, Richmond, about **$40,000.** CD 6/8—ENR 6/18.

Calif., San Pedro—PLANT—Western Pipe & Steel Co., 5717 S. Santa Fe Ave., Vernon, 1 story, 102x471 ft., wood frame shop bldg., to E. S. McKittrick Co., 7839 Santa Fe Ave., Huntington Park. Est. over **$40,000.**

Calif., Vernon (br. Los Angeles)—FACTORY—Aluminum Co. of America, 5151 Alcoa Ave., 100x160 ft., frame, stucco, factory. Owner builds. **$40,000.**

Ill., Chicago—FACTORY — Available Truck Co., 2501 N. Elston Ave., 1 story, brick factory, 2501 N. Elston Ave., to Person Constr. Co., 130 N. Wells St. Est. **$50,000.** G. Lehle, 4554 Bway., archt.

Ill., Chicago—FACTORY — Clearing Industrial Dist., 6455 S. Central Ave., 1 story, 100x300 ft. factory addn., separate contracts. J. S. Cromelin, c/o owner, archt. American Gear & Mfg. Co., 6645 W. 65 St., lessee.

Ill., Monee—FACTORY—Cardox Corp., 307 N. Michigan Ave., general contract factory addn., to E. E. Husak, 833 N. California Ave. Est. over **$40,000.** C. D. Faulkner, 307 N. Michigan Ave., archt.

Ia., Clinton — PLANT — Gateway Brewing Co., Clinton, general contract plant, to Clinton Engineering Co., Clinton. **$150,000.**

Kan., Kansas City—PLANT—Gustin-Bacon Mfg. Co., 1412 W. 12 St., 200x300 ft., brick, concrete mfg. plant, to Collins Const. Co., 912 Baltimore Ave., Kansas City, Mo. Est. **$300,000.** C. E. Keyser, 609 Minnesota Ave., archt.

Md., Baltimore — SUBSTATION — Baltimore Transit Co., Equitable Bldg., brick, substation and waiting room, concrete fdn., to Cogswell Constr. Co., 513 Park Ave., approx. **$40,000.** A. F. Worthington, 14 W. Hamilton St., archt.

Mass., Springfield—WAREHOUSE — Indian Motorcycle Co., 837 State St., 4 story, 30x60 ft., brick, concrete warehouse, State St., to E. F. Carlson Co., 1694 Main St. Est. **$40,000.**

Mass., Worcester—FACTORY—Arter Grinding Machine Co., 15 Sagamore Rd., altering 2 story, 25x90 ft. brick factory addn., Sagamore Rd., to E. Whitehead, Inc., 97 Union St. Est. **$40,000.**

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Mich., Wakefield—MINE—Pickands-Mather Co., 700 Sellwood Bldg., Duluth, Minn., general contract mine bldgs., to Frank Tomlinson & Co., Ashland, Wis.; total at **$132,000.** H. S. Starin, 308 Sellwood Bldg., Duluth, Minn., archt.

Minn., Minneapolis—SHOPS—Minneapolis & St. Louis R.R., C. S. Weatherill, ch. engr., Northwestern Bank Bldg., shop bldgs., own forces. **$40,000.**

O., Cleveland—FACTORY—Beverage Eng. & Equipment Co., G. J. Hewlett, pres., 2166 W. 4 St., 1 story, 90x200 ft. brick, timber factory addn., to Peters Constr. Co., 8805 Madison Ave. Est. **$40,000.**

O., Cleveland—FACTORY—Lewis Machine Co., M. W Lewis, pres., 3441 E. 76 St., 1 story, 30x141 ft. factory and 40x60 ft. office bldg., to James Humel, 3124 Albion Rd. Est. **$40,000.** CD 6/16—ENR 6/18.

O., Cleveland—FACTORY—National Acme Co., F. H. Chapin, pres., 170 131 St., altering factory, to Cleveland Constr. Co., 3866 Carnegie Ave. Est. **$40,000.** Geo. S. Rider Co., Terminal Tower, engrs.

O., Columbus — FACTORY — Timken Roller Bearing Co., 1025 Cleveland Ave., 2 brick, steel, concrete factory bldgs., to Hadlock Krill Co., 2169 E. 33 St., Cleveland, est. **$400,000.** CD 4/30—ENR 5/7.

Pa., Bradford—PLANT—Bovaird & Seyfang Mfg. Co., S. W. Gregg, Sr., pres., design and construction alterations 4 story, brick, steel plant, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. between **$50,000** and **$100,000.** CD 7/6—ENR 7/9.

Pa., Phila.—PLANT—Cresheim Cleaners & Dyers, 8517-8519 Germantown Ave., plant addn., to George H. Hinkle, 107 Erdenheim Rd.

Pa., Wilkes-Barre — PLANT — Leon-Ferenbach Silk Co., 91 Jones St., 1 story, 52x84 ft. plant addn., to O. J. Behrens & Son, Wilkes-Barre, Pa. Est. **$40,000** with equip.

Tex., Edinburg—PACKING PLANT—Betnsen Bros., McAllen, citrus and vegetable packing plant, day labor. **$40,000.** CD 4/22—ENR 4/30.

Tex., Fairbanks—CARBON PLANT—Columbian Carbon Co., c/o M. R. Howell, 711 Ben Milam Hotel, Houston, carbon plant, incl. 11 one-story frame bldgs., garages, 3 warehouses, office bldg., utilities, etc., to J. L. Peake, 207 Ben Milam Hotel, Houston, approx. **$150,000.** Ford, Bacon & Davis, P. O. Box 148-604 Santa Fe Bldg., Galveston, consult. engrs. CD 6/12—ENR 6/18.

Wis., Milwaukee—FOUNDRY—Falk Corp., 3001 West Canal St., design and construction, 1 story, 83x175 ft. foundry, to Klug & Smith, 111 E. Wisconsin Ave.

Wis., Oshkosh—PLANT—Bell Machine Co., 35 Jackson Dr., 1 story, 52x125 ft., rein.-con. factory, to C. R. Meyer & Sons Co., 50 State St., Oshkosh.

B. C., Vancouver—PLANT—North Vancouver Ship Repairs, Ltd., foot of Rogers St., North Vancouver, plant addn., to W. Stewart Constr. Co., Ltd., 615 W. Pender St., **$365,000.**

Ont., Brantford — PLANT — Massey-Harris Co., Ltd., Market St., altering, equipping plant, to Cromar Constr. Co., Ltd., 448 Colborne St., about **$87,500.** Allward & Gouinlock, 57 Bloor St., Toronto, archts.

Ont., Hamilton—PLANT—Owner, c/o Prack & Prack archts., Pigott Bldg., Hamilton, plant exten., Sanford Ave. N., to Pigott Const. Co. Ltd., Pigott Bldg. **$50,000.**

Ont., Toronto — BOILER ROOM — British American Oil Co. Ltd., Royal Bank Bldg., boiler room, to Ramsay Contg. Co. Ltd., 39 Indian Rd. Cres. **$45,000.**

Ont., Toronto—PLANT—De Havilland Aircraft of Canada, Ltd., Sheppard Ave. W., Toronto, plant expansion, to A. W. Robertson, Ltd., 57 Bloor St. W., Toronto, approx. **$300,000.**

Ont., Toronto—PLANT—Peerless Engineering Ltd., 11 Charlotte St., plant, Branton Ave., to J. Robert Page, 18 Toronto St., about **$235,560** with equip. CD 4/14—ENR 4/16.

Que., Lachine—PLANT — Dominion Bridge Co., Ltd., 1 Ave., altering plant, own forces. **$101,500.**

Que., Montreal (Longueuil) — PLANT — Owner, c/o T. Pringle & Son, Ltd., engrs., 485 McGill St., Montreal, addnl. alterations, extens., to Marien-Wilson, Ltd., 1434 St. Catherine St. W., Montreal, about **$200,000**

Que., St. Georges de Champlain—PLANT—Eastern Lumber Co., Ltd., Victoriaville, veneer and lumber plant, (saw mill), day labor. **$100,000.**

Que., St. Johns—PLANT—Perry, Luke & Little, archts., 1405 Bishop St., Montreal, 3 story (part), 75x132 ft. plant exten. for Demetre Sault & Ciriez (Canada) Ltd., 159 Cousins St., to Jean Paul Trahan, 178 Mercier St., about **$162,000** incl. equip. CD 5/13 and 7/8—ENR 5/28.

ON GUARD

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(Continued on opposite page)

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